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EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT SECTION 313

GUIDANCE FOR PETROLEUM BULK STORAGE FACILITIES

(Version 1.0)

CONTENTS

SECTION 313 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT

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INTRODUCTION

This guidance document has been prepared to assist petroleum bulk storage facilities in complying with the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA, Public Law 99-499, Title III of the Superfund Amendments and Reauthorization Act of 1986, hereafter EPCRA Section 313) and Section 6607 of the Pollution Prevention Act (PPA). This guidance document is intended for use along with the Toxic Chemical Release Inventory Reporting Form R and Instructions document published annually by the U.S. Environmental Protection Agency (EPA). For further assistance and to obtain copies of the latest version of this instruction document, contact the EPCRA Hotline at 1-800-535-0202. The other EPCRA reporting programs are summarized at the end of this section.

One of the primary goals of the EPCRA program is to increase the public's knowledge of, and access to, information on both the presence of Section 313 chemicals in their communities and on releases and other waste management activities of Section 313 chemicals into the environment. Since 1987, certain facilities in the manufacturing sector have been reporting information on releases and other waste management activities of Section 313 chemicals to EPA and states throughout the United States. As a result of an EPA rulemaking (62 FR 23834, May 1, 1997), certain additional industry groups, including petroleum bulk storage facilities (Standard Industrial Classification (SIC) 5171), are now required to evaluate their chemical use and management activities to determine potential reporting responsibilities under EPCRA Section 313.

Section 313 establishes annual reporting requirements for Section 313 chemicals provided that certain activity thresholds are met. Section 313 includes a list of over 650 chemicals and chemical categories. These chemicals and chemical categories were either originally selected by Congress or were added by EPA through rulemaking.

The Section 313 reporting requirements apply to owners or operators of facilities which meet all of the following three criteria:

- The facility must be in SIC code 10 (except 1011, 1081, and 1094), or 12 (except 1241), or 20-39 (manufacturing facilities), or 4911 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce) and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), or 4953 (limited to facilities regulated under RCRA subtitle C), or 5169, or **5171,** or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); and,

- The facility has 10 or more full-time employees or the equivalent, and
- The facility manufactures (defined to include importing), or processes, or otherwise uses any Section 313 chemical in quantities greater than the established threshold in the course of a calendar year.

For each Section 313 chemical or chemical category, covered facilities must report the total annual releases, both routine and accidental, to all environmental media; and other on-site waste management activities, including quantities recycled, combusted for energy recovery and treated for destruction, and off-site transfers for disposal, waste treatment, energy recovery and recycling. This information is submitted on the Toxic Chemical Release Inventory (TRI) Reporting Form, which is called the "Form R." (As discussed in the following chapter, facilities meeting certain conditions are eligible to report using an abbreviated Form A.)

The annual Form R or Form A reports are submitted to EPA headquarters and to a state designated agency, usually a State Emergency Response Commission (SERC) buy may be a Tribal Emergency Response Commission (TERC), annually on or before July 1st for activities occurring during the previous calendar year (e.g., July 1, 1999, for activities during the period from January 1 to December 31, 1998).

EPCRA mandated that EPA establish and maintain a national TRI database to assist in research and the development of regulations, guidelines, and standards related to Section 313 chemicals and to make the TRI data available to the general public and any interested parties. The TRI database is computer-accessible to anyone with a modem via the National Library of Medicine's TOXNET on-line system. The TRI data are also available through many other sources, including EPA's Internet Web site; public libraries on microfiche; the Government Printing Office on CD-ROM; and the National Technical Information Service on magnetic tape and individual state diskettes.

Facility owners or operators who violate the Section 313 reporting provisions may be assessed civil penalties of up to $25,000 per day for each violation. In addition, state enforcement provisions may also be applicable depending on the state's EPCRA Section 313 reporting regulations.

This document is organized into several sections to provide quick reference. Section 2 presents an overview of the Section 313 reporting requirements. Section 3 provides a detailed discussion of how to make threshold determinations regarding the manufacture, processing, and otherwise use of Section 313 chemicals. Section 4 covers general concepts relating to reporting and release estimating, and provides potential data sources for determining releases at petroleum bulk storage facilities and other amounts managed. Section 5 presents a detailed discussion of EPCRA Section

313 release and other waste management scenarios in the petroleum bulk storage industry and covers developing estimates of releases and other waste management activities for several types of operations commonly encountered by the petroleum bulk storage industry. Finally, Appendix A provides an alphabetical listing of the Section 313 chemicals and chemical categories subject to EPCRA Section 313, the *de minimis* concentrations for each Section 313 chemical, and the RCRA status of the chemical. Appendix B provides a list of Section 313 related materials and relevant online information sources for petroleum bulk storage facilities.

Table 1-1 Summary of Reporting Requirements Under EPCRA

EPCRA Section	Reporting Requirements
Sections 302 - 303 Presence of Extremely Hazardous Substances (40 CFR §355.30)	If a facility has one or more "extremely hazardous substances" present on site in quantities greater than Threshold Planning Quantities (TPQs) established by EPA, it must notify its State Emergency Response Commission (SERC) and Local Emergency Planning Committee (LEPC) that it is subject to the emergency planning requirements of these sections. A facility representative must be designated to participate in the local emergency planning process. The facility also must provide any information deemed necessary for development or implementation of a local emergency plan.
Section 304 Emergency Notification (40 CFR §355.40)	A facility must notify the LEPC and SERC immediately of the release of any "extremely hazardous substance" (listed in 40 CFR Part 355, Appendices A and B) or any hazardous substance under CERCLA (listed in 40 CFR 302.4), in amounts at or above the specified Reportable Quantities that EPA establishes for each substance. The facility must follow up this initial notification with a written statement providing details of the incident.
Section 311 Material Safety Data Sheet (MSDS) Reporting (40 CFR §370.21)	A facility must submit to the LEPC, SERC, and local fire department a list of Material Safety Data Sheets (MSDSs), or copies of MSDSs, for any "hazardous chemicals" (as defined under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard) that are present on site in quantities greater than 10,000 pounds. A facility also must report any "extremely hazardous substances" (EHS) (as defined under Section 302) that are present on site in quantities at or above the TPQ or 500 pounds, whichever is less. Submissions are required within 90 days of the date when new chemicals are first present at or above specified thresholds or if new information on previously reported chemicals becomes available. Some states have established lower activity thresholds.
Section 312 Hazardous Chemical Inventory (40 CFR §370.25)	A facility must submit to the LEPC, SERC, and local fire department certain information for any "hazardous chemical" or EHS reportable under Section 311. This information is most commonly submitted on a Tier I or Tier II Form and includes a description of any type of hazard the material may pose, the quantities stored, general storage locations, and type of storage. The reports for each calendar year are due on or before March 1 of the following year. Most states require or request that facilities submit the more detailed Tier II reporting form or a state-issued version of that form. In addition, some states have established lower activity thresholds and require more detailed or additional information.

EPCRA Section	Reporting Requirements
Section 313 Toxic Chemical Release Inventory Reporting (Form R) (40 CFR §372)	A facility in certain SIC codes meeting threshold requirements is required to report annually amounts of listed Section 313 chemicals released or otherwise managed to EPA and designated state agencies. Section 313 includes a list of over 650 chemicals and chemical categories. Release reporting information is submitted on the Toxic Chemical Release Inventory (TRI) Reporting Form, Form R. The Section 313 reporting requirements apply to owners or operators of facilities which meet all of the following three criteria: ■ Facility must be in SIC code 10 (except 1011, 1081, and 1094), or 12 (except 1241), or 20-39 (manufacturing facilities), or 4911 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce) and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), or 4953 (limited to facilities regulated under RCRA subtitle C), or 5169, or **5171,** or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); and, ■ Facility must have 10 or more full-time employees (or the total hours worked by all employees is greater than 20,000 hours), and ■ Facility must manufacture (including importation), process, or otherwise use a listed Section 313 chemical in excess of specific threshold quantities. The threshold quantities for reporting under Section 313 are based on the amount of the Section 313 chemical manufactured, processed, or otherwise used during the calendar year. Specifically, the thresholds are greater than 25,000 pounds if manufactured, or 25,000 pounds if processed, or 10,000 pounds if otherwise used. EPCRA mandated that EPA establish and maintain a national TRI database to assist in research and the development of regulations, guidelines, and standards related to Section 313 chemicals and to make the TRI data available to the general public and any interested parties. The TRI database is computer-accessible to anyone with a modem via the Internet or the National Library of Medicine's TOXNET on-line system.

SECTION 2
SECTION 313 REPORTING REQUIREMENTS

WHO MUST REPORT?

A facility is subject to the provisions of the Section 313 reporting requirements if it meets all three of the following criteria:

- The facility must be in SIC code 10 (except 1011, 1081, and 1094), or 12 (except 1241), or 20-39 (manufacturing facilities), or 4911 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce) and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), or 4953 (limited to facilities regulated under RCRA subtitle C), or 5169, or **5171,** or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis) hereafter "covered SIC codes"; and,

- Facility must have 10 or more full-time employees (or the total hours worked by all employees is greater than 20,000 hours), and

- The facility manufactures (defined to include importation), or processes, or otherwise uses any Section 313 chemical in quantities greater than the established threshold in the course of a calendar year.

Instructions regarding how to determine the facility SIC code, employee threshold, or activity follows; for additional detail please consult the *Toxic Chemical Release Inventory Reporting Form R and Instructions*, a document published annually by EPA.

In addition, pursuant to Executive Order (EO) 12856 signed by the President on August 3, 1993, Federal facilities are required to determine the applicability of the EPCRA Section 313 reporting requirements regardless of the facility's SIC codes. Federal facilities that have 10 or more full time employees or the equivalent and manufacture, process, or otherwise use listed Section 313 chemicals at or above established thresholds are subject to EPCRA Section 313 reporting. Federal facilities were required to begin reporting no later than reporting year 1994; their first Form R or Form A reports were due by July 1, 1995.

The amount of the chemical released to the environment does not affect the need to report. Even if there are no releases of a listed Section 313 chemical, a facility must report if it meets the requirements regarding SIC code, number of employees, and activity threshold. A threshold determination must be made individually for each Section 313 chemical.

Thresholds are based on operation year, this includes partial year reporting and reporting by a facility that is going through closure. The facilities should consider the portion of the year for which they operated to determine the actual employee hours worked as well as threshold determination and release reporting.

Reduced Reporting

On November 30, 1994, EPA published a final rule (59 FR 61488) that provides an alternative reporting option to qualifying facilities. Eligible facilities wishing to take advantage of this alternative reporting option may report on a simplified two page form referred to as Form A and do not have to use Form R. The rule entitled "TRI Alternate Threshold for Facilities with Low Annual Reportable Amounts," provides facilities that otherwise meet EPCRA Section 313 activity thresholds the option of reporting on Form A, provided that they do not exceed 500 pounds for the total annual reportable amount (defined below) for that chemical, and that the amounts manufactured, processed or otherwise used do not exceed 1 million pounds. As with determining an activity threshold to determine if the chemical activity has been exceeded, facilities must evaluate each activity threshold separately; for example, a facility that manufactures 900,000 pounds per year of a Section 313 chemical and processes 150,000 pounds per year of a Section 313 chemical would still be eligible to use the Form A.

For the purpose of reporting on Form A, the annual reportable amount is equal to the combined total quantities released (including disposed) at the facility, treated at the facility (as represented by amounts destroyed or converted by treatment processes), recycled at the facility, combusted for the purpose of energy recovery at the facility, and amounts transferred from the facility to off-site locations for the purpose of recycling, energy recovery, treatment, and/or disposal. These quantities do not include amounts of the chemical accidentally released. These volumes correspond to the sum of amounts reported on Form R, as Part II column B of section 8, data elements 8.1 (quantity released), 8.2 (quantity used for energy recovery on-site), 8.3 (quantity used for energy recovery off-site), 8.4 (quantity recycled on-site), 8.5 (quantity recycled off-site), 8.6 (quantity treated on-site), and 8.7 (quantity treated off-site). See Section 4 of this document for more guidance on completing Part II, Section 8 of Form R.

What is a facility?

Under EPCRA, a "facility" is defined as all buildings, equipment, structures, and other stationary items which are located on a single site or contiguous or adjacent sites and which are owned or operated by the same person (or by any person which controls, is controlled by, or under common control with such person). An "establishment" is generally a single physical location, where business is conducted or where services or industrial operations are performed. A facility may contain more than one establishment. For example, a refinery, bulk terminal, and warehouse would be one facility if all three units were owned and operated by the same company, and are located on the same contiguous or adjacent properties. A single facility therefore can be a multi-establishment complex. Such a facility may submit reports that cover all its establishments, or the individual establishments may report separately. However, for the purposes of determining thresholds, all chemical activities for the entire facility must be considered.

How to determine your SIC Code*

Standard Industrial Classification (SIC) codes 10 (except 1011, 1081, and 1094), 12 (except 1241), 20-39 (manufacturing facilities), 4911, 4931 and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), 4953 (limited to facilities regulated under RCRA subtitle C), 5169, 5171, and 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis) are covered under section 313 of EPCRA. The first two digits of a 4-digit SIC code define a major business sector, while the last two digits denote a facility's specialty within the major sector. A facility should determine its own SIC code(s), based on its activities on-site and the "Standard Industrial Classification Manual 1987." In some cases, a state agency or other organization may have assigned SIC codes on a different basis than the one used in the SIC Manual. For the purposes of TRI reporting, state assigned codes should not be used if they differ from ones assigned using the SIC Manual.

Your facility may include multiple establishments that have different SIC codes. In order to determine which SIC code best represents the facility, the facility should calculate the value of the products or services produced or provided at/by or shipped from each establishment within the facility and then use the following rule to determine if your facility comes within the covered SIC codes, and the SIC code criterion is met.

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*Please note: The North American Industrial Classification System that appeared in the *Federal Register* on April 9, 1997 will replace the 1987 Standard Industrial Classification System (SIC). Regulatory entities, including EPA, will take steps to adopt the new classification system over the next few years. In the meantime, facilities should consider their activities in relation to the 1987 SIC code system until further notification is made.

- If the total value of the products or services shipped, produced or provided at establishments in "covered" SIC codes is greater than 50 percent of the value of the entire facility's products and services, the entire facility comes within the covered SIC codes, and the SIC code criterion is met.

- If any one establishment in the specified set of SIC codes produces, provides or ships products or service whose value exceeds the value of products and services produced or shipped by all other establishments within the facility, the facility comes within the covered SIC codes, and the SIC code criterion is met.

The value of production or service attributable to a particular establishment may be isolated by subtracting the product or service value obtained from other establishments within the same facility from the total product or service value of the facility. This procedure eliminates the potential for "double counting" production or service in situations where establishments are engaged in sequential production activities at a single facility.

How to Determine Your Number of Employees

A "full time employee," for the purpose of Section 313 reporting, is defined as 2,000 work hours per year. The number of full time employees is dependent only upon the total number of hours worked by all employees during the calendar year for that facility and not the number of persons working. To determine the number of full time employees working for your facility, add up the hours worked by all employees during the calendar year including contract employees and sales and support staff, and divide the total by 2,000 hours. In other words, if the total number of hours worked by all employees is 20,000 hours or more, your facility meets the ten employee threshold.

Facilities may have contract workers present at times to conduct maintenance and service operations, including equipment, motor vehicle, and building maintenance, construction, and operating processes and waste management activities (e.g., remediation). The hours of all these contract workers count toward the employee threshold for reporting under Section 313. In addition, the hours worked by professionals (e.g., those on salary, that do not clock in or out) also count towards the facility's employee threshold. Employees that perform activities which routinely occur off-site such as truck drivers, but who are based at the facility are also counted towards the employee threshold. Routine activities performed at the facility by outside personnel such as contract drivers that are not based at the facility are not counted towards the employee threshold.

CHEMICAL ACTIVITY THRESHOLDS

Section 313 requires a facility that meets the SIC code and employee criteria to submit Form R reports for any listed Section 313 chemical or chemical category that it manufactures in annual quantities greater than 25,000 pounds, processes in annual quantities greater than 25,000 pounds, or otherwise uses in annual quantities greater than 10,000 pounds (40 CFR §372.3). These thresholds (manufacture, process, or otherwise use) will be referenced throughout this document as "activity thresholds." Chemicals must be evaluated in association with one or more of these three categories when determining whether an activity threshold has been exceeded. These categories are:

- **Manufacture** - "Manufacture" means to produce, prepare, compound, or import a listed Section 313 chemical. Import is defined as causing the Section 313 chemical to be imported into the customs territory of the United States. If you order a listed Section 313 chemical (or a mixture containing the chemical) from a foreign supplier, then you have imported the chemical when that shipment arrives at your facility directly from a source outside of the United States. By ordering the chemical, you have "caused it to be imported," even though you may have used an import brokerage firm as an agent to obtain the Section 313 chemical. If the importation was directed by the parent company, then the facility receiving the chemical is not considered to have imported the chemical.

  The term manufacture also includes coincidental production of a listed chemical (e.g., as a byproduct or impurity) as a result of the manufacture, processing, otherwise use, or waste management of other chemical substances. The fact that the coincidental manufacturing of these byproducts is not the primary purpose of the facility is irrelevant. Listed EPCRA Section 313 chemicals coincidentally manufactured by a facility must be factored into threshold determinations and release calculations.

- **Manufactured Activities and Definitions**

  - Produced or imported for on-site use/processing
    A chemical that is produced or imported and then further processed or otherwise used at the same facility.
  - Produced or imported for sale/distribution
    A chemical that is produced or imported specifically for sale or distribution outside the facility.

- Produced as a by-product

  A chemical that is produced coincidentally during the production, processing, otherwise use, or disposal of another chemical substance or mixture and, following its production, is separated from that other chemical substance or mixture. Section 313 chemicals produced and released as a result of waste treatment for disposal are also considered byproducts.

- Produced as an impurity

  A chemical that is produced coincidentally as a result of the manufacture, processing, or otherwise use of another chemical but is not separated and remains primarily in the mixture or product with that other chemical.

- **Process** - "Process" means the preparation of a listed Section 313 chemical, after its manufacture, for distribution in commerce. Processing is usually the intentional incorporation of a Section 313 chemical into a product. Processing includes preparation of the Section 313 chemical in the same physical state or chemical form as that received by your facility, or preparation that produces a change in physical state or chemical form. The term also applies to the processing of a mixture or other trade name product that contains a listed Section 313 chemical as one component. Processing activities include use of Section 313 chemicals as reactants, in formulations, and as article components, and repackaging. Processing may also include the recycling of a Section 313 chemical for distribution in commerce. For example, if a facility receives a waste containing a Section 313 chemical from off-site, stabilizes, and repackages the waste in one calendar year and then distributes the repackaged waste into commerce in the following year. The facility would count the amount of the Section 313 chemical stabilized as being processed in the year it was treated.

  Relabeling or redistributing of the Section 313 chemical where no repackaging of the Section 313 chemical occurs does not constitute processing of the Section 313 chemical.

- **Processed Activities and Definitions**

  - As a reactant

    A natural or synthetic chemical used in chemical reactions for the manufacture of another chemical substance or product. This includes, but is not limited to, feedstocks, raw materials, intermediates, and initiators.

- As a formulation component
  A chemical added to a product (or product mixture) prior to further distribution of the product that acts as a performance enhancer during use of the product. Examples of Section 313 chemicals used in this capacity include, but are not limited to, additives, dyes, reaction diluents, initiators, solvents, inhibitors, emulsifiers, surfactants, lubricants, flame retardants, and rheological modifiers.
- As an article component
  A chemical that becomes an integral component of an article distributed for industrial, trade, or consumer use.
- Repackaging
  Processing or preparation of a Section 313 chemical (or product mixture) for distribution in commerce in a different form, state, or quantity. This includes, but is not limited to, the transfer of material from a bulk container, such as a tank truck, to smaller containers such as cans or bottles.

- **Otherwise use** - Any use involving a listed Section 313 chemical at a facility that does not fall under the definitions of 'manufacture" or "process" is an otherwise use of that chemical. A chemical that is otherwise used by a facility is not incorporated into a product distributed in commerce and includes use of the Section 313 chemical as a chemical processing aid or as a manufacturing aid or for ancillary uses such as treating wastes. Otherwise use of a Section 313 chemical does not include disposal, stabilization (without subsequent distribution in commerce), or treatment for destruction unless:

  (1) The Section 313 chemical that was disposed, stabilized, or treated for destruction was received from off-site for the purposes of further waste management, or

  (2) The Section 313 chemical that was disposed, stabilized, or treated for destruction was manufactured as a result of waste management activities on materials received from off-site for the purpose of further waste management.

Relabeling or redistributing of the Section 313 chemical where no repackaging of the Section 313 chemical occurs does not constitute the otherwise use of the Section 313 chemical.

- **Otherwise Used Activities and Definitions**

  - As a chemical processing aid

    A chemical that is added to a reaction mixture to aid in the manufacture or synthesis of another chemical substance but is not intended to remain in or become part of the product or product mixture. Examples of such Section 313 chemicals include, but are not limited to, process solvents, catalysts, inhibitors, initiators, reaction terminators, and solution buffers.

  - As a manufacturing aid

    A chemical that aids the manufacturing process that does not become part of the resulting product and is not added to the reaction mixture during the manufacture or synthesis of another chemical substance. Examples include, but are not limited to, process lubricants, metalworking fluids, coolants, refrigerants, and hydraulic fluids.

  - Ancillary or other use

    A chemical that is used at a facility for purposes other than aiding chemical processing or manufacturing as described above. Examples of such Section 313 chemicals include, but are not limited to, cleaners, degreasers, lubricants, fuels, and chemicals used for treating wastes.

For purposes of the otherwise use definition, EPA interprets ***waste management*** activities to include recycling, combustion for energy recovery, treatment for destruction, waste stabilization, and release, including disposal. Waste management does not include the storage, container transfer, or tank transfer of a Section 313 chemical if no recycling, combustion for energy, treatment for destruction, waste stabilization, or release of the chemical occurs at the facility. (See 62 FR 23850)

Recycling for the purposes of EPCRA Section 313 means the following: (1) the recovery for reuse of a Section 313 chemical from a gaseous, aerosol, aqueous, liquid, or solid stream; or (2) the reuse or the recovery for use of a Section 313 chemical that is a RCRA hazardous waste as defined in 40 CFR Part 261. Recovery is the act of extracting or removing the Section 313 chemical from a waste stream and includes: (1) the reclamation of the Section 313 chemical from a stream that entered a waste treatment or pollution control device or process where destruction of the stream or destruction or removal of certain constituents of the stream occurs (including air pollution control devices or processes, wastewater treatment or control devices or processes, Federal or state permitted treatment or control devices or processes, and other types of treatment

or control devices or processes); and (2) the reclamation for reuse of an "otherwise used" Section 313 chemical that is spent or contaminated and that must be recovered for further use in either the original or any other operations. (See EPA document, *Interpretations of Waste Management Activities: Recycling, Combustion for Energy Recovery, Waste Stabilization and Release.)*

Combustion for energy recovery is interpreted by EPA to include the combustion of a Section 313 chemical that is (1) (a) a RCRA hazardous waste or waste fuel, (b) a constituent of a RCRA hazardous waste or waste fuel, or (c) a spent or contaminated "otherwise used" material; and that (2) has a heating value greater than or equal to 5,000 British thermal units (BTU) per pound in an energy or materials recovery device. Energy or materials recovery devices are boilers and industrial furnaces as defined in 40 CFR §372.3 (See 62 FR 23891). In determining whether an EPCRA Section 313 listed chemical is combusted for energy recovery, the facility should consider the BTU value of the Section 313 chemical and not of the chemical stream. If the heating value of the Section 313 chemical is below 5,000 BTU, the chemical is being treated for destruction. A facility that blends and subsequently distributes in commerce a waste-derived fuel "processes" EPCRA Section 313 listed chemicals that are constituents of that waste-derived fuel. In contrast, if subsequent to blending the waste-derived fuel, that same facility combusts on-site the waste-derived fuel in an energy recovery unit, the facility "otherwise uses" EPCRA Section 313 listed chemicals that are constituents of that waste-derived fuel. An EPCRA Section 313 listed chemical that has a heat value of less than 5,000 BTUs and that is a constituent of a waste-derived fuel is "otherwise used" if that fuel is combusted in an on-site energy recovery unit (62 FR 23851).

EPA defines ***Treatment for destruction*** to mean the destruction of a Section 313 chemical in waste such that the substance is no longer the Section 313 chemical subject to reporting under EPCRA Section 313. Treatment for destruction does not include the destruction of a Section 313 chemical in waste where the Section 313 chemical has a heat value greater than 5,000 British Thermal Units (BTU) and is combusted in any device that is an industrial boiler or furnace. (See 40 CFR §372.3.) "Treatment for destruction" includes acid or alkaline neutralization if the Section 313 chemical is the entity that reacts with the acid or base. "Treatment for destruction" does not include: (1) neutralization of a waste stream containing Section 313 chemicals if the Section 313 chemicals themselves do not react with the acid or base (See 40 CFR §372.3), (2) preparation of a Section 313 chemical for disposal, (3) removal of Section 313 chemicals from waste streams, and (4) activities intended to render a waste stream more suitable for further use or processing, such as distillation or sedimentation. For example, neutralization of pure nitric acid is considered treatment for destruction. In contrast, neutralization of nitric acid containing three percent lead is not considered treatment for destruction of the lead component, because the lead has not reacted with the neutralizing agent (See 62 FR 23852).

EPA defines ***Waste stabilization*** to mean any physical or chemical process used to either reduce the mobility of hazardous constituents in a hazardous waste or eliminate free liquid as determined by a RCRA approved test method (e.g., Test Method 9095). A waste stabilization process includes mixing the hazardous waste with binders or other materials and curing the resulting hazardous waste and binder mixture. Other synonymous terms used to refer to this process are "stabilization," "waste fixation," or "waste solidification." (See 40 CFR §372.3.)

Release is defined by EPCRA Section 329(8) to mean any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any Section 313 chemical. (See 40 CFR §372.3.)

Disposal is defined by EPCRA to mean any underground injection, placement in landfills/surface impoundments, land treatment, or other intentional land disposal. (See 40 CFR §372.3.)

Based on EPA's evaluation of facilities in SIC 5171, the Agency believes that petroleum storage and distribution activities routinely involve or result in the manufacturing, processing, or otherwise use of EPCRA Section 313 chemicals (62 FR 23834; May 1, 1997). Thresholds must be calculated separately for manufacture, process, or otherwise use of the same chemical. If any single activity threshold is met or exceeded, the facility must submit a Form R covering all nonexempt activities. Petroleum bulk storage facilities often process Section 313 chemicals in petroleum products as a result of repackaging, mixing, or blending the products. Petroleum bulk storage facilities will be required to factor into their threshold determinations and reporting calculations the quantities of EPCRA Section 313 chemicals used in support activities such as froth flotation, non-motor vehicle equipment maintenance, and dewatering. Chemicals involved in these support activities are classified under the otherwise use category.

EXEMPTIONS

Section 313 provides for exemptions from reporting for specific "processing" or "otherwise use" activities. The instructions provided in *Toxic Chemical Release Inventory Reporting Form R and Instructions* should be reviewed carefully before proceeding. The following discussion summarizes the exemption instructions. A facility does not have to consider amounts of listed Section 313 chemicals involved in any of these processing or otherwise use activities when determining if activity thresholds have been exceeded or when estimating environmental releases. Limited exemptions apply to manufacturing activities. For example, manufacturing a Section 313 chemical for research and development purposes and manufacturing as an impurity below a specified level in a product distributed beyond the facility both can be exempt. The EPA's *Toxic*

Chemical Release Inventory Questions and Answers, Revised 1990 Version [EPA 560/4/91-003 (will be revised in near future)] and the *Toxic Release Inventory Reporting Form R and Instructions* also contain information about these exemptions. (See Appendix B for ordering information.)

- The ***de minimis*** exemption allows facilities to disregard certain minimal concentrations of chemicals in mixtures or trade name products they "process" or "otherwise use" in making threshold determinations and release and other waste management determinations. The *de minimis* exemption does not apply to the "manufacture" of a Section 313 chemical except if that Section 313 chemical is "manufactured" as an impurity and remains in the product distributed in commerce below the appropriate *de minimis* level. The *de minimis* exemption does not apply to a byproduct "manufactured" coincidentally as a result of "manufacturing," "processing," "otherwise use," or any waste management activities.

  This *de minimis* exemption applies solely to "mixtures" and trade name products. EPA's long-standing interpretation has been that "mixture" does not include waste. Therefore, the *de minimis* exemption cannot be applied to Section 313 chemicals in a waste even if the waste is being "processed" or "otherwise used."

  When determining whether the *de minimis* exemption applies to a listed Section 313 chemical, the owner or operator should only consider the concentration of the Section 313 chemical in mixtures and trade name products in process streams in which the Section 313 chemical is undergoing a reportable activity. If the Section 313 chemical in a process stream is "manufactured" as an impurity, "processed," or "otherwise used" and is below the appropriate *de minimis* concentration level, then the quantity of the Section 313 chemical in that process stream does not have to be applied to threshold determinations nor included in release or other waste management determinations. If a Section 313 chemical in a process stream meets the *de minimis* exemption, all releases and other waste management activities associated with the Section 313 chemical in that stream are exempt from EPCRA section 313 reporting. It is possible to meet an activity (e.g., processing) threshold for a Section 313 chemical on a facility-wide basis, but not be required to calculate releases or other waste management quantities associated with a particular process because that process involves only mixtures or trade name products containing the Section 313 chemical below the *de minimis* level.

  Once a Section 313 chemical concentration is above the appropriate *de minimis* concentration, threshold determinations and release and other waste management determinations must be made, even if the chemical later falls below *de minimis* level in the same process stream. Thus, all releases and other quantities managed as waste which occur after the *de minimis* level has been exceeded are then subject to reporting. If a Section 313

chemical in a mixture or trade name product above *de minimis* is brought on-site, the *de minimis* exemption never applies.

The *de minimis* concentration level is consistent with the OSHA Hazard Communication Standard requirements for development of Material Safety Data Sheets (MSDSs). The *de minimis* level is 1.0 percent except if the Section 313 chemical is an OSHA-defined carcinogen. The *de minimis* level for OSHA-defined carcinogens is 0.1 percent. For mixtures or other trade name products that contain one or more members of a listed Section 313 chemical category, the *de minimis* level applies to the aggregate concentration of all such members and not to each individually. The list of Section 313 chemicals in the publication *Toxic Chemical Release Inventory Reporting Form R and Instructions* for the current reporting year contains the *de minimis* values for each of the Section 313 chemicals and chemical categories.

- **Materials that are processed or used as articles** - Quantities of a listed Section 313 chemical contained in an article do not have to be factored into threshold or release determinations when that article is processed or otherwise used at your facility. An article is defined as a manufactured item that is formed to a specific shape or design during manufacture, that has end-use functions dependent in whole or in part upon its shape or design during end-use, and that does not release a Section 313 chemical under the normal conditions of the processing or use of that item at the facility.

  If the processing or otherwise use of like articles results in a total release of less than 0.5 pounds of a Section 313 chemical in a calendar year to all environmental media, EPA will allow this release quantity to be rounded to zero, and the manufactured items remain exempt as articles. EPA requires facilities to round off and report all estimates to the nearest whole number. The 0.5-pound limit does not apply to each individual article, but applies to the sum of all releases from processing or otherwise use of like articles.

  The article exemption applies to the normal processing or otherwise use of an article. It does not apply to the manufacture of an article. Thus, Section 313 chemicals processed into articles manufactured at a facility must be factored into threshold and release determinations.

  A closed item containing Section 313 chemicals (e.g., a transformer containing PCBs) that does not release the Section 313 chemicals during normal use is considered an article if a facility uses the item as intended and the Section 313 chemicals are not released. If a facility services the closed item (e.g., a transformer) by replacing the Section 313 chemicals, the

Section 313 chemicals added during the reporting year must counted in threshold and release and other waste management calculations.

- **Materials that are structural components of the facility** - Chemicals present in materials used to construct, repair, or maintain a plant building are exempt from the activity thresholds. For example, solvents and pigments present in paint used to coat the structural components of a building would be exempt from threshold determination and release reporting.

- **Materials used for janitorial or facility grounds maintenance** - Chemicals present in materials used for routine or facility grounds maintenance are exempt from the activity thresholds. Examples include bathroom cleaners, fertilizers, and garden pesticides in the same form and concentration commonly distributed to consumers. Chemicals used for equipment maintenance, such as the use of oil or cleaning solvents, are not exempt.

- **Materials used with facility motor vehicles** - Chemicals present in materials used for operating and maintaining motor vehicles operated by the facility are exempt from the activity thresholds. Examples include gasoline, radiator coolant, and windshield wiper fluid used in equipment such as cars, trucks, forklifts, and tow motors.

- **Personal items** - Chemicals present in materials such as foods, drugs, cosmetics, or other personal items are exempt from the activity thresholds. Examples include materials used in the facility cafeteria and infirmary. Chemicals used for heating and air conditioning solely to provide comfort to personnel are also exempt from reporting. If a building's temperature is regulated to facilitate a process or treatment operation, the Section 313 chemicals used to heat or cool the building are not exempt. Units that supply both personal comfort and operational needs may be apportioned, if it is possible to separate them.

- **Laboratory materials** - Chemicals used in certain laboratory activities that are conducted under the supervision of a technically qualified individual (as defined under 40 CFR §720.3(ee)) are exempt from the activity thresholds. The laboratory activities exemption applies only to sampling and analysis, research and development, and quality assurance and quality control activities. The exemption does not apply to the use or production of listed Section 313 chemicals in pilot-plant operations and laboratories for distribution in commerce (e.g., specialty chemicals) and laboratory support services.

- **Materials as they are drawn from the environment or municipal sources** - Chemicals contained in intake water (used for processing or non-contact cooling) or in intake air (used either as compressed air or for combustion) are exempt from the activity thresholds.

- **Property owners** - Property owners that merely own real estate on which a facility covered by Section 313 is located and have no business interest in the operation of that facility (e.g., a company owns an industrial park) are exempt for Section 313 reporting. The operator of that facility, however, is subject to reporting requirements.

SUPPLIER NOTIFICATION REQUIREMENTS

Because manufacturers reporting under Section 313 must know the Section 313 chemical composition of the products they use to be able to accurately calculate releases, EPA requires some suppliers of mixtures or trade name products containing one or more of the listed Section 313 chemicals to notify their customers of the identity of the chemical in the mixture or the trade name product. This requirement has been in effect since January 1, 1989.

A facility must comply with the Section 313 supplier notification requirements if it owns or operates a facility which meets all of the following criteria.

- The facility is in SIC codes 20-39,
- The facility manufactures, imports, or processes a Section 313 chemical, and
- The facility sells or otherwise distributes in commerce a mixture or trade name product containing the Section 313 chemical to either:
  - A facility described in 40 CFR §372.22 (covered facility group), or
  - A facility that then sells the same mixture or trade name product to a facility described in 40 CFR §372.22 (covered facility group).

The supplier notification requirements do not apply to TRI chemicals that are themselves wastestreams or are constituents of wastestreams.

LISTED SECTION 313 CHEMICALS

Appendix A to this document contains an alphabetical listing of the chemicals subject to Section 313 reporting at the time of publication of this document, including their *de minimis* concentrations. EPA publications *Common Synonyms for Section 313 Chemicals* (EPA 745-R-

95-008) and *Consolidated List of Chemicals Subject to Reporting Under the Act (Title III List of Lists)* (EPA-550-B-96-015) may also be useful references when reviewing the chemicals at your facility for Section 313 coverage.

The list of Section 313 chemicals is amended frequently. Users of this guidance document or other documents listing Section 313 chemicals are cautioned that changes may have occurred to the list of Section 313 chemicals since publication of the original list or addition of the chemical through administrative action. The list of Section 313 chemicals presented in the *Toxic Chemical Release Inventory Reporting Form R and Instructions* for the current reporting year should always be consulted as the most up-to-date source of currently listed Section 313 chemicals. For the latest information on Section 313 chemical listings, contact the EPCRA Hotline at 1-800-535-0202.

Some of the Section 313 chemicals have qualifiers included with their names. Reporting on these chemicals are determined by the conditions specified in the qualifiers. Chemicals that are listed without parenthetic qualifiers are subject to reporting in all forms in which they are manufactured, processed, or otherwise used. Descriptions of the qualifiers are as follows:

- **Fume or dust** - Three of the metals on the list of Section 313 chemicals (aluminum, vanadium, and zinc) contain the qualifier "fume or dust." Fume or dust refers to dry forms of these metals, not to "wet" forms such as solutions or slurries. Thus, a facility should determine if, for example, it generated more than 25,000 pounds of "aluminum (fume or dust)." Similarly, there may be certain technologies in which one of these metals is processed in the form of a fume or dust to make other Section 313 chemicals or other products for distribution in commerce. In reporting releases, the facility would report only releases of the fume or dusts.

  EPA considers dusts to consist of solid particles generated by any mechanical processing of materials including crushing, grinding, rapid impact, handling, detonation, and decrepitation of organic and inorganic materials such as rock, ore, and metal. Dusts do not tend to flocculate, except under electrostatic forces. A fume is an airborne dispersion consisting of small solid particles created by condensation from a gaseous state, in distinction to a gas or vapor. Fumes arise from the heating of solids such as aluminum. The condensation is often accompanied by a chemical reaction such as oxidation. Fumes flocculate and sometimes coalesce. Other metals, (e.g., such as lead or copper) are not limited by this qualifier and are subject to reporting in all forms (fume, dust, and wet).

- **Manufacturing qualifiers** -Two of the entries in the Section 313 chemical list contain a qualifier relating to manufacture. For isopropyl alcohol, the qualifier is "manufacturing - strong acid process". For saccharin the qualifier simply is "manufacturing." For isopropyl alcohol, the qualifier means that only facilities manufacturing isopropyl alcohol by the strong acid process are required to report. In the case of saccharin, only manufacturers of the Section 313 chemical are subject to the reporting requirements. A facility that processes or otherwise uses either Section 313 chemical would not be required to report for those chemicals. In both cases, the facility is not required to provide supplier notification because only the manufacturer, not the user, of the Section 313 chemical must report.

- **Ammonia (includes anhydrous ammonia and aqueous ammonia from water dissociable ammonium salts and other sources; 10 percent of total aqueous ammonia is reportable under this listing)** - The qualifier for ammonia means that anhydrous forms of ammonia are 100 percent reportable and aqueous forms are limited to 10 percent of total aqueous ammonia. Therefore, when determining thresholds, releases, and other waste management quantities all anhydrous ammonia is included but only 10 percent of total aqueous ammonia is included. Any evaporation of ammonia from aqueous ammonia solutions is considered anhydrous ammonia and should be included in the appropriate threshold and release determinations.

- **Phosphorus (yellow or white)** - The listing for phosphorus is qualified by the term "yellow or white" This means that only manufacturing, processing, or otherwise use of phosphorus in the yellow or white chemical forms require reporting. Conversely, manufacturing, processing, or otherwise use of "black" or "red" phosphorus does not trigger reporting.

- **Asbestos (friable)** - The listing for asbestos is qualified by the term "friable," referring to the physical characteristic of being able to be crumbled, pulverized, or reducible to a powder with hand pressure. Only manufacturing, processing, or otherwise use of asbestos in the friable form triggers reporting.

- **Aluminum oxide (fibrous forms)** - The listing for aluminum oxide is qualified by the term "fibrous forms." Fibrous refers to a man-made form of aluminum oxide that is processed to produce strands or filaments which can be cut to various lengths depending on the application. Only manufacturing, processing, or otherwise use of aluminum oxide in the fibrous form triggers reporting.

- **Hydrochloric acid and sulfuric acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)** - The qualifier for hydrochloric acid and sulfuric acid means that only aerosol forms of this chemical are reportable. Aqueous solutions are not covered by this listing, but airborne forms generated from aqueous solutions are covered.

- **Nitrate compounds (water dissociable; reportable only when in an aqueous solution)** - The qualifier for the nitrate compounds category limits the reporting to nitrate compounds that dissociate in water, and thereby generate nitrate ions. For the purposes of threshold determinations, the entire weight of the nitrate compound must be included in all calculations. For the purposes of reporting releases and other waste management quantities, only the weight of the nitrate ion should be included in the calculations of these quantities.

WHAT MUST BE REPORTED?

If your facility is included in the specified set of SIC codes, has ten or more full-time employees or the equivalent, and manufactures, processes, or otherwise uses one of the listed Section 313 chemicals in amounts greater than the appropriate thresholds, you must report the following information on Form R:

- Name and location of your facility;

- Identity of the listed Section 313 chemical (unless you claim its identity to be a trade secret);

- Whether you manufacture, process, or otherwise use the chemical any other way;

- Maximum quantity of the chemical on-site at any time during the year;

- Quantities of the chemical released during the year to environmental media, including both accidental spills and routine emissions;

- Quantities of the chemical subject to on site waste management actions, including recycling, energy recovery, or waste treatment;

- Off-site locations to which you shipped wastes containing the chemical and the quantities of the chemical sent to those locations;

- Information on source reduction activities; and

- Treatment methods used for wastes containing the chemical and estimates of their efficiency for the reportable Section 313 chemical.

A release is defined under EPCRA Section 329(8) as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any listed Section 313 chemical. The definition of release includes the abandonment or discarding of barrels, containers, and other closed receptacles. Separate release estimates must be provided for releases to air, water, and land (e.g., deep well injection, surface impoundment, permitted landfill).

DOCUMENTING REPORTING EFFORTS

Sound recordkeeping practices are essential for accurate and efficient TRI reporting. EPA requires that facilities keep a copy of each Form R or Form A report filed for at least three years from the date of submission (40 CFR §372.10). These reports will also be of use to facilities in subsequent years when completing future Form R or Form A reports. EPA also requires that facilities maintain those documents, calculations, worksheets, and other forms upon which they relied to file Form R or Form A reports. EPA may request this supporting documentation from the facility, for example, to conduct data quality reviews of present or past Form R or Form A submissions.

Supporting documentation, organized by year, that a facility should maintain may include, if applicable:

- Previous years' Forms Rs and Form As;
- Section 313 Reporting Threshold Worksheets (a sample worksheet is given in the *Toxic Chemical Release Inventory Reporting Form R and Instructions* document;
- Engineering calculations and other notes;
- Purchase records from suppliers;
- Inventory data;
- EPA (NPDES) permits and monitoring reports;
- EPCRA Section 312, Tier II Reports;
- Monitoring records;
- Flowmeter data;

- RCRA Hazardous Waste Generator's Report;
- Pretreatment reports filed by the facility with the local government;
- Invoices from waste management companies;
- Manufacturer's estimates of treatment efficiencies;
- RCRA Manifests; and
- Process diagrams.

SECTION 3
MAKING THE THRESHOLD DETERMINATION

Petroleum bulk stations and terminals in SIC 5171 include facilities engaged in the wholesale distribution of liquid petroleum products and liquefied petroleum gases. Products handled by these facilities include gasoline, diesel, fuel oil, kerosene, crude oil, naphtha, and lubricating oils. Bulk storage stations and terminals have a bulk storage capacity of 10,000 gallons or more. Facilities classified in SIC code 5172 are not subject to Section 313 reporting. Facilities in SIC 5172 include establishments primarily engaged in the wholesale distribution of petroleum and petroleum products without bulk liquid storage facilities (i.e., storage capacity less than 10,000 gallons) such as packaged and bottled petroleum products distributors, truck jobbers, and others marketing petroleum and its products at wholesale, but without bulk liquid storage facilities.[1]

If, during the reporting year, a facility usually classified in SIC code 5172 (such as a truck jobber) stores greater than 10,000 gallons of petroleum product on-site, the facility becomes classified in SIC code 5171 and is then subject to Section 313 reporting for the reporting year.

A separate Toxic Chemical Release Inventory Reporting Form must be submitted for each listed chemical that is "manufactured," "processed," or "otherwise used" above an activity threshold at your facility, assuming the SIC code and employee criteria are met. Current EPCRA Section 313 guidance for petroleum bulk storage facilities is shown in Table 3-1:

Table 3-1 Examples of Manufactured, Processed, and Otherwise Used Chemicals at Petroleum Bulk Storage Facilities *

Manufactured Chemicals	
The term manufacture includes importing a listed Section 313 chemical. "Import" is defined as causing the Section 313 chemical to be imported into the customs territory of the United States. If you order a petroleum product containing a Section 313 chemical from a foreign supplier, then you have imported, and thus manufactured, the chemical when that shipment arrives at the facility directly from a source outside of the United States.	
Activity	**Examples**
Produced or imported for on-site use/processing	May not occur in the petroleum bulk storage industry.

[1]U.S. Bureau of Census. *1992 Industry and Product Classification Manual*, pp. 212-213.

Manufactured Chemicals (continued)	
Activity	**Examples**
Produced or imported for sale/distribution	Import of crude oil to be stored and/or processed prior to distribution off-site.
Produced as a by-product	May not occur in the petroleum bulk storage industry.
Produced as an impurity	May not occur in the petroleum bulk storage industry.

Processed Chemicals
Repackaging is considered a type of processing, including any transfer of a Section 313 chemical from one container to another, regardless of the size or type of containers involved. The transfer of Section 313 chemicals between trucks, bulk storage containers, and pipelines for further distribution in commerce also constitutes repackaging. "Repackaging" refers to the act of removing a Section 313 chemical from one container and placing it in another. Simply relabeling a container that contains a Section 313 chemical without taking the material out of the container does not constitute "processing" of the Section 313 chemical. For example, a facility that receives drums of lubrication oil, relabels the drums, and sends the drums off-site for further distribution in commerce without opening the drums and removing the oil is not processing (i.e., repackaging) the Section 313 chemical(s) present in the oil.
The *de minimis* exemption may apply to Section 313 chemicals that are processed at a facility. Section 313 chemicals that are below *de minimis* concentration levels in petroleum products are not counted towards that processing threshold. If a facility inserts additives into fuel prior to distribution off site, the Section 313 chemicals above *de minimis* in the agents or additives must be counted towards the threshold, even if these chemicals are later present at below *de minimis* concentrations in the fuel distributed off site.
Petroleum product that is not brought on site to be stored and redistributed off site does not fall within the definition of processing. For example, a storage facility may send tanker trucks to pick up gasoline from a refinery and transport it directly to the gasoline station without bringing the fuel to be stored on site at the storage facility. The amount of fuel that is transferred directly to the gasoline station is not counted towards the processing threshold.

Activity	Examples
As a reactant	May not occur in the petroleum bulk storage industry.
As a formulation component	Blending of additives or other agents into gasoline and aviation fuel prior to distribution into commerce.
As an article component	May not occur in the petroleum bulk storage industry.
Repackaging	Transfer of gasoline from bulk storage tanks to tanker trucks for further distribution in commerce.

Otherwise Used Chemicals	
The use of an EPCRA Section 313 chemical in support activities such as cleaning and equipment maintenance constitutes otherwise use of that chemical.	
Activity	**Examples**
As a chemical processing aid	May not occur in the petroleum bulk storage industry.
As a manufacturing aid	Application of lubricants for pump and valve operation.
Ancillary or other use	Diesel used to clean tanks.

* More complete discussions of the industry-specific examples can be found in Section 5 of this guidance manual.

Current EPCRA Section 313 guidance states that:

- Storage by itself is not considered a manufacturing, processing, or otherwise use activity under EPCRA Section 313. (However, amounts of Section 313 chemicals that are released from the storage units must be considered for release or waste management reporting if the threshold for the chemical has been exceeded elsewhere at the facility.)

- EPCRA Section 327 exempts transportation or storage incidental to transportation from Section 313. Materials that are under active shipping are exempt until the facility takes possession or ownership of the materials. Any materials not under active shipping papers are not exempt. Section 313 chemicals not contained in materials under active shipping papers, e.g., chemicals remaining in tanks and chemicals used for clean out, are not exempt from Section 313 reporting. Fugitive emissions from materials under active shipping papers are also exempt. An establishment located at a facility that maintains a pipeline system that transports exempt material remains subject to Section 313 reporting. The pipelines themselves are not exempt, since Section 327 exempts only the material inside the pipes.

- Section 313 chemicals undergoing a remediation activity are not being "manufactured," "processed," or "otherwise used;" therefore, are not considered toward these reporting thresholds. These amounts may require consideration for release reporting for amounts released or otherwise managed if a threshold for the Section 313 chemical is exceeded elsewhere at the facility.

CONDUCTING THE THRESHOLD DETERMINATION

STEP ONE
Identify Section 313 chemicals that are manufactured, processed or otherwise used.

An activity threshold determination must be made individually for each Section 313 chemical by each activity in which the chemical is manufactured, processed, or otherwise used at your facility. The threshold determination is one criterion used to ascertain whether a Form R or Form A is required to be submitted.

Section 313 reporting is required if threshold quantities are exceeded. Separate thresholds apply to the amount of the Section 313 chemical that is manufactured, processed, or otherwise used. Your facility must report for any listed Section 313 chemical that is manufactured above 25,000 pounds, processed above 25,000 pounds, or otherwise used in excess of 10,000 pounds during the course of the calendar year.

STEP TWO
Identify "processing" and "otherwise use" activities that are subject to exemptions. Exclude chemicals associated with these activities from your threshold determination.

Any chemical purchased by facilities for use as processing or manufacturing aids or for treating waste are considered "otherwise used". In addition, EPCRA Section 313 chemicals in materials purchased to be used as fuel or for maintaining equipment operations, other than for maintaining motor vehicles, should be included in the threshold determination for "otherwise use" activities. Any EPCRA Section 313 chemicals in materials purchased to be used in the waste management processes should also be included in the threshold determination for "otherwise use" activities.

When performing your threshold determinations, it is important to remember that exemptions apply to certain facility-related activities. These exemptions were discussed in Section 2 of this guidance document and may apply only to certain "manufacturing," "processing," or "otherwise use" activities. For the purposes of an activity threshold analysis, the following areas should be examined closely to determine whether the TRI chemicals subject to certain activities should be included in the activity threshold and reporting calculations:

- **Laboratories:** Sampling and analysis, research and development (R&D), and QA/QC activities undertaken in laboratories are exempt if conducted under the supervision of a

technically qualified individual. Pilot plants and support services, such as photo processing, waste water treatment, and instrument sterilization are not exempt. Wastes generated during sampling and analysis, R&D, and QA/QC activities in an on-site laboratory are exempt.

- **Motor vehicles**: Use of products containing Section 313 chemicals for the purpose of most motor vehicle maintenance activities are exempt, as well as fuel used in those vehicles.

- **Routine janitorial or facility grounds maintenance**: The routine maintenance exemption is intended to cover janitorial or other custodial or plant grounds maintenance activities using such substances as bathroom cleaners, or fertilizers and pesticides used to maintain lawns, in the same form and concentration commonly distributed to consumers. Equipment maintenance such as the use of oil or grease is not exempt.

- **Structural component of the facility**: This exemption covers Section 313 chemicals that are incorporated into the structural components of the facility (e.g., metal in pipes) or that are used to ensure or improve the structural integrity of a structure (e.g., paint). The facility is not required to report the releases of Section 313 chemicals that result from "passive" degradation (degradation or corrosion that occurs naturally in structural components of facilities).

- **Materials as they are drawn from the environment or municipal sources-** Chemicals contained in intake water (used for processing or non-contact cooling) or in intake air (used either as compressed air or for combustion) are exempt from the activity thresholds. However, EPCRA Section 313 chemicals manufactured from use of the air or water are not exempt and must be considered for the threshold determination.

In making threshold determinations, it is important that you keep in mind that a *de minimis* exemption applies only to Section 313 chemicals in mixtures or trade name products manufactured as impurities or processed or otherwise use in mixtures or trade name products. This exemption does not apply to chemicals that are manufactured as byproducts nor does it apply to chemicals in wastes that are processed or otherwise used.

Most activities performed by petroleum bulk storage facilities involve Section 313 chemicals which are "processed." The repackaging, mixing, and blending of petroleum products constitute processing. Because the *de minimis* exemption applies to amounts "processed," only quantities of Section 313 chemicals at concentrations above *de minimis* must be applied to the 25,000 pound threshold. In order to perform a comprehensive and accurate threshold determination, you must first determine what Section 313 chemicals are present in the petroleum product, and then determine which of those Section 313 chemicals are present above the *de minimis* level. Only the

Section 313 chemical is considered for threshold determination, not the entire mixture. The concentration of the Section 313 chemical in the petroleum product must be known in order to determine if a threshold has been exceeded.

STEP THREE

Determine whether TRI chemicals are present in mixtures or trade name products that are processed or otherwise used below the *de minimis* concentration threshold and eliminate from further consideration in your processing and otherwise use threshold determination those chemicals below *de minimis*, unless those chemicals are later concentrated. Also determine whether chemicals are present as impurities below the *de minimis* concentration threshold in manufactured products and eliminate from further consideration in your manufacturing threshold determination those chemicals below *de minimis*.

In addition, Section 313 chemicals present at less than 1 percent (10,000 ppm) for chemicals that do not meet the OSHA carcinogen standard or less than 0.1 percent (1,000 ppm) for chemicals that do meet the OSHA carcinogen standard do not have to be considered when making your threshold determinations for processing or otherwise use. Appendix A to this document contains the list of Section 313 chemicals subject to reporting, along with the *de minimis* concentration associated with the chemical. The list of Section 313 chemicals in the publication *Toxic Chemical Release Inventory Reporting Form R and Instructions* for the current reporting year should also be checked to determine whether the list of chemicals has been updated (e.g., changes in listed chemicals and chemical categories, and *de minimis* levels).

The best available information should be used to estimate the approximate concentration of the chemical in the petroleum liquid. If you have data regarding chemical concentrations in the petroleum liquid, use the data. If specific concentration data of Section 313 chemicals in petroleum liquids are not available, you facility may use the default values provided in Tables 3-2 and 3-4. Table 3-2 lists a number of Section 313 chemicals that may be present in various petroleum substances and the estimated concentration values of the constituents. If the facility does not have any specific information of the content of Section 313 in the petroleum product, Table 3-2 may be used to estimate concentration values of constituents. Because petroleum products vary greatly in chemical composition and concentration, your facility should use the best available information to determine threshold calculations. Table 3-3 lists the chemicals that may be present above *de minimis* levels in various petroleum products. If there is no method to estimate quantities of a Section 313 chemical on-site, a facility is not required to report on the chemical.

Table 3-2 Estimated Concentration Values of Section 313 Constituents in Crude Oil and Petroleum Products (Weight Percent)

Section 313 Chemical	*De Minimis* Level*	Crude Oil	Gasoline (Various Grades)	No.2 Fuel Oil/ Diesel Fuel	Jet Fuel (JP-4)	Ker-osene	Lubri-cating Oil	No. 6 Fuel Oil	Aviation Gasoline
Benzene	0.1	0.446	1.608	8.0E-04	1.054	N/A	N/A	0.001	0.515
Biphenyl	1.0	N/A	0.010	0.100	N/A	N/A	N/A	N/A	N/A
Bromine	1.0	N/A	N/A	N/A	N/A	N/A	N/A	3.0 E-06	N/A
Chlorine	1.0	N/A	N/A	N/A	N/A	N/A	N/A	7.8 E-04	N/A
Cyclohexane	1.0	0.700	0.240	N/A	1.240	N/A	N/A	N/A	N/A
Ethylbenzene	1.0	0.346	1.605	0.013	0.481	N/A	N/A	2.2E-03	0.432
n-Hexane	1.0	2.463	7.138	1.0E-04	5.110	N/A	N/A	N/A	3.000
MTBE[b]	1.0	N/A	15.000	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	1.0	0.219	0.444	0.550	0.468	0.160	N/A	0.100	0.100
Phenanthrene	1.0	N/A	N/A	0.125	N/A	N/A	N/A	N/A	N/A
PACs[c]	0.1	4.0E-04	N/A	N/A	N/A	N/A	N/A	1.130	N/A
Styrene	0.1	N/A	3.528	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	1.0	0.878	7.212	0.032	1.854	N/A	N/A	0.006	7.327
1,2,4-Trimethyl-benzene	1.0	0.326	2.500‡	1.000‡	N/A	N/A	N/A	N/A	N/A
Xylene (mixed isomers)	1.0	1.420	7.170	0.290	2.299	N/A	N/A	0.013	2.204
Antimony[a]	0.1	1.0 E-05	N/A	N/A	N/A	N/A	N/A	1.0 E-06	N/A
Arsenic[a]	0.1/1.0 [c]	2.0 E-05	N/A	8.5 E-06	N/A	N/A	N/A	6.0 E-06	N/A
Beryllium[a]	0.1/1.0 [c]	2.0 E-07	N/A	5.0 E-06	N/A	N/A	N/A	N/A	N/A
Cadmium[a]	0.1/1.0 [c]	4.0 E-07	N/A	2.1 E-05	N/A	N/A	N/A	N/A	N/A
Chromium[a]	0.1/1.0 [d]	4.0 E-05	N/A	9.5 E-05	N/A	N/A	N/A	4.5 E-07	N/A
Cobalt[a]	1.0	3.0E-04	N/A	N/A	N/A	N/A	N/A	1.5 E-05	N/A

Section 313 Chemical	*De Minimis* Level*	Crude Oil	Gasoline (Various Grades)	No.2 Fuel Oil/ Diesel Fuel	Jet Fuel (JP-4)	Kerosene	Lubricating Oil	No. 6 Fuel Oil	Aviation Gasoline
Copper[a]	1.0	4.0 E-05	N/A	5.6 E-04	N/A	N/A	N/A	3.0 E-05	N/A
Lead Compounds	1.0 (organic) 0.1 (inorg.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14~ (organic)
Manganese[a]	1.0	N/A	N/A	2.1 E-05	N/A	N/A	N/A	0.005	N/A
Mercury[a]	1.0	6.0E-04	N/A	4.0 E-05	N/A	N/A	N/A	5.0 E-07	N/A
Nickel[a]	0.1	5.5E-03	N/A	3.38 E-04	N/A	N/A	N/A	3.8E-03	N/A
Selenium[a]	1.0	4.0 E-04	N/A	N/A	N/A	N/A	N/A	9.0 E-06	N/A
Silver[a]	1.0	N/A	N/A	N/A	N/A	N/A	N/A	2.0 E-08	N/A
Zinc Compounds	1.0	N/A	N/A	N/A	N/A	N/A	1.000	N/A	N/A

Source: *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313*, Appendices B and H, *"Memorandum from Patrick B. Murphy, Radian/RTP to James F. Durham, EPA/CPB Concerning Petroleum Refinery Liquid HAP and Properties Data, August 10, 1993,"* and *"Memorandum from Paul C. Bailey, Jr., API/Washington, DC to James F. Durham, EPA/CPB Concerning Revised Estimates of Heavy Petroleum Product Liquid Constituents, December 23, 1993"*

N/A - Concentration data not available based on data sources reviewed

* The *de minimis* concentration values for the metals is for the metal compound.

~ Lead compounds and n-Hexane concentration for Aviation Gasoline 100 (Exxon-MSDS).

‡ Concentrations updated with comments received from API.

[a] Constituents are most likely metal compounds rather than the elements. Elements are listed in this table because concentration data are for only the metals occurring in the fuel. Concentrations for metal compounds would be somewhat higher depending on the metal compound. For threshold determination, if the weight of the compound is not known, facilities may use the weight of the lowest metal compound likely to be present.

[b] MTBE may be present to enhance octane in concentrations from 0-15%.

[c] The de minimis level for inorganic compounds is 0.1; for organic compounds is 1.0.

[d] The de minimis level for chromium VI compounds is 0.1; for chromium III compounds is 1.0.

[e] The petroleum products may contain one or more of the following chemicals under the polycyclic aromatic compounds (PACs) category: benzo(a)anthracene, benzo (b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(rst)pentaphene, benzo(a)phenanthrene, benzo(a)pyrene, dibenz(a,h)acridine, dibenz(a,j)acridine, dibenzo(a,h)anthracene, 7H-Dibenzo(c,g)carbazole, dibenzo(a,e)fluoranthene, dibenzo(a,e)pyrene, dibenzo(a,h)pyrene, dibenzo(a,l)pyrene, 7,12-dimethylbenz(a)anthracene, indeno[1,2,3-cd]pyrene, 5-methylchrysene, 1-nitropyrene. For No. 6 fuel oil, the value given is for benzo(a)anthracene.

Facilities in SIC 5171 may engage in mixing and blending of petroleum products prior to distribution off site in commerce, which constitutes processing. Blending operations may consist of mixing refined motor fuel with oxygenated compounds such as methanol, ethanol, or methyl tertiary butyl ether (MTBE). However, blending operations usually occur at the petroleum refinery. The blending agents may constitute up to 20% of the fuel. These compounds are mixed into the fuel to increase octane rating and reduce vehicle emissions.

Table 3-3 Constituents in Petroleum Products That May Be Present Above *De Minimis*

	Crude Oil	Gasoline (Various Grades)	No. 2 Fuel Oil/ Diesel Fuel	Jet Fuel (JP-4)	Lubricating Oil	No. 6 Fuel Oil	Aviation Gasoline
Benzene	✓	✓		✓			✓
Cyclohexane				✓			
Ethylbenzene		✓					
MTBE		✓					
n-Hexane	✓	✓		✓			✓
PACs						✓	
Styrene		✓					
Toluene		✓		✓			✓
1,2,4-Trimethylbenzene		✓	✓				
Xylene (mixed isomers)	✓	✓		✓			✓
Zinc Compounds					✓		

Source: *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313*, Appendices B and H, *"Memorandum from Patrick B. Murphy, Radian/RTP to James F. Durham, EPA/CPB Concerning Petroleum Refinery Liquid HAP and Properties Data, August 10, 1993,"* and *"Memorandum from Paul C. Bailey, Jr., API/Washington, DC to James F. Durham, EPA/CPB Concerning Revised Estimates of Heavy Petroleum Product Liquid Constituents, December 23, 1993"*. Table reflects updated information from comments received on guidance document for 1,2,4-Trimethylbenzene content in gasoline.

More commonly, facilities may process Section 313 chemicals by adding proprietary additive packages to motor fuels prior to distribution off-site. Facilities that perform mixing activities

must consider the Section 313 chemicals present above *de minimis* concentrations in the agents and additives towards the 25,000 threshold for processing, even if the concentration of the additives or agents in the final product distributed off site falls below the *de minimis* concentration level.

Petroleum bulk stations and terminals may also exceed the threshold for manufacturing, processing, or otherwise using a Section 313 chemical. The facility may manufacture a Section 313 chemical by importing a petroleum product that contains Section 313 chemicals. Section 313 chemicals present in the petroleum product must be counted towards the 25,000 pound threshold for manufacturing.

In addition, you must determine what Section 313 chemicals are subject to the otherwise use threshold. Materials used in tank and pipe maintenance such as cleaners and lubricants may contain Section 313 chemicals. These chemicals, if above *de minimis* concentration levels, must be applied to the 10,000 pound threshold for otherwise use.

In order to determine whether or not a threshold for a Section 313 chemical has been exceeded, the facility must compile all available information. Under EPCRA Section 313, facilities are required to use whatever is available to them that would assist them in making the most accurate estimates where required. MSDSs, inventory/shipping data, and process knowledge can be used in determining the amount of chemicals manufactured, processed, and otherwise used at petroleum bulk storage facilities. Threshold determinations are made based on the best available information within your facility. EPCRA does not require a facility to install new monitoring equipment or conduct additional sampling activities.

STEP FOUR

Gather data needed for calculations of threshold determination, including:

- **Inventory Data**
- **Consumption Information**
- **Supplier Notification**
- **Sampling and Analysis Data**
- **MSDS**
- **Analysis of Waste Products**
- **Permits**

Threshold determinations are made based on the best available information in your possession. However, if a facility is aware that a chemical is probably present in a mixture but has no information on its concentration in the mixture, then they are not required to consider that chemical in its threshold determinations. Though, in general, the following methods should be employed to determine the appropriate concentrations to use in threshold determinations:

- If the extract concentration is known (e.g., 33.0% toluene), use it.

- If only the upper bound is known (e.g., <5% toluene or 0-5% toluene), use it (e.g., 5% toluene).

- If the concentration is know (e.g., 10-30% toluene), then use the midpoint (e.g., 20% toluene).

- If only the lower bound is known, assume the upper bound is 100%. Factor out other known constituents (e.g., 10% water and >60%toluene), create a range (e.g., 60-90% toluene) and then use the midpoint (e.g., 75% toluene).

STEP FIVE

Calculate the quantity of each chemical manufactured, processed and otherwise used, in pounds, to determine whether the activity threshold has been exceeded. The Form R must be completed for each chemical otherwise used in excess of 10,000 pounds and for each chemical processed in excess of 25,000 pounds, for each chemical manufactured in excess of 25,000 pounds.

In cases where certain materials that have broad ranges or high upper bounds for multiple constituents (e.g., %x+%y+%z=110% of mixture), the total components of a mixture should not exceed 100%. In these instances, the best available information should be used to estimate the approximate concentration of the chemicals in the material. However, if a facility is aware that a chemical is probably present in a mixture but has no information on its concentration in the mixture, then they are not required to consider that chemical in its threshold determinations.

In summary, petroleum bulk stations and terminals may exceed the threshold for manufacturing, processing, or otherwise using a Section 313 chemical. The facility may manufacture a Section 313 chemical by importing a petroleum product that contains Section 313 chemicals.

Petroleum bulk stations and terminals engage in activities that process Section 313 chemicals in petroleum products. The facility must determine what listed Section 313 chemicals are present above *de minimis* in petroleum products in order to determine if the processing threshold has been exceeded for each Section 313 chemical in the petroleum product. An estimate of how much gasoline (as well as other petroleum products) must be processed to exceed the 25,000 pound threshold for certain constituents is found in Table 3-4. The amount of product that would exceed that threshold varies depending on the concentration of the constituents in the product. The facility may also process listed Section 313 chemicals that are present in additives incorporated into petroleum products.

Petroleum bulk stations and terminals also engage in activities such as equipment maintenance that involve the "otherwise use" of listed Section 313 chemicals in cleaners and lubricants.

Table 3-4 Estimated Quantities Required to Exceed the Processing Threshold for Several Petroleum Products

Product	Section 313 Chemicals That May Be Present Above *De Minimis*	Concentration (weight percent)	Quantity of Product Required to Meet the 25,000-lb Threshold for Processing (Gallons)
Gasoline (Various Grades)	Benzene	1.608	258,389
	Ethylbenzene	1.605	258,872
	MTBE	15.000	27,699
	n-Hexane	7.138	58,208
	Styrene	3.528	117,769
	Toluene	7.212	57,611
	1,2,4-Trimethylbenzene	2.500	166,196
	Xylene (mixed isomers)	7.170	57,948
No. 6 Fuel Oil	Benz(a)anthracene (PACs)	1.130	276,549
Crude Oil	Benzene	0.446	794,526
	n-Hexane	2.463	143,873
	Xylene (mixed isomers)	1.420	249,548
No. 2 Fuel Oil/Diesel Fuel	1,2,4-Trimethylbenzene	1.000	357,143
Lubricating Oil	Zinc Compounds	1.000	351,865
Aviation Gas	Benzene	0.515	831,940
	n-Hexane	3.000	142,816
	Toluene	7.327	58,475
	Xylene (mixed isomers)	2.204	194,396
Jet Fuel (JP-4)	Benzene	1.054	380,359
	Cyclohexane	1.240	323,305
	n-Hexane	5.110	78,454
	Toluene	1.854	216,234
	Xylene (mixed isomers)	2.299	174,379

Source: *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313*,Appendices Band H,"*Memorandum from Patrick B. Murphy, Radian/RTP to James F. Durham, EPA/CPB Concerning Petroleum Refinery Liquid HAP and Properties Data, August 10, 1993*," and *"Memorandum from Paul C. Bailey, Jr., API/Washington, DC to James F. Durham, EPA/CPB Concerning Revised Estimates of Heavy Petroleum Product Liquid Constituents, December 23, 1993"*

Updated information from comments received on guidance document for 1,2,4-Trimethylbenzene in gasoline and No. 2 fuel oil/Diesel fuel; information updated for n-Hexane in aviation gasoline from Exxon MSDS.

SECTION 4
OVERVIEW OF SECTION 313 RELEASE ESTIMATION

This section presents general guidelines for preparing Section 313 release estimates. It begins with a discussion of general ideas on estimating chemical releases. A summary of errors that commonly occur in Section 313 reporting follows.

GENERAL CONCEPTS

Release Estimation

A Form R or Form A must be completed for each Section 313 chemical that meets the applicable activity thresholds. Each form requests facility specific information and identifies the chemical for which thresholds were exceeded. Form A (the abbreviated report) includes a statement that the facility did not exceed specified amounts while, the main components of Form R are environmental release estimates to all media for the reportable chemical during the preceding calendar year. This includes all wastes containing the reportable Section 313 chemical that are sent off-site from the facility for further waste management. Specifically, facility release estimates must be made for the following release sources:

- Releases to air from fugitive or non-point sources (Section 5.1)
- Releases to air from stack or point sources (Section 5.2)
- Releases to water directly discharged to a receiving stream (Section 5.3)
- Releases in wastes that are injected underground (Section 5.4)
- Releases to land on-site (Section 5.5)
- Releases to water discharged to a publicly owned treatment works (POTW) (Section 6.1)
- Wastes transferred off-site for recycling, energy recovery, waste treatment, or disposal (Section 6.2)

Development of accurate and comprehensive release estimates requires consideration of all possible release pathways. The threshold determination provides valuable information when beginning the release estimation process for a Section 313 chemical: each material containing a Section 313 chemical is identified. For each of these materials, the facility should identify all potential release sources. A useful way to do this is to draw a process flow diagram that traces the material's path through the plant. The process flow diagram should identify each major piece of equipment (including pollution control devices) through which the material passes, from its initial entry into the facility to its final disposition. The diagram should also identify all potential release sources and pollution control equipment for the chemical.

After you have identified all the potential release sources for a chemical, you can estimate releases for each source. Often, the starting point for a release estimate is chemical throughput data, which are typically available from threshold determination calculations.

Given the chemical throughput quantities for a process, you must apply other data and assumptions to complete the estimates. This information includes process-specific data (e.g., scrubber efficiency) and any data developed for other environmentally oriented purposes (e.g., air and wastewater monitoring data, air and water permits and permit applications, RCRA manifest data, monitoring data).

Section 313 does not require any new monitoring to be performed. Facilities should use existing data to calculate release estimates. The accuracy of a release estimate is proportional to the quantity and quality of the data used in its preparation. Situations may arise where estimates based on one set of data contradict estimates based on another. In such cases, the facility should document the rationale for using one data set (or method) versus another. If a facility is aware that a chemical is probably present but has no method to estimate releases or quantities on site, then they are not required to report on that chemical.

Release estimates can be developed by combining all available data with assumptions concerning the fate of each chemical in the process. There are four general methods for developing a release estimate. These methods may be used together or in sequence in developing release estimates.

- **Direct measurement** (basis of estimate code = M; entered in Part II Sections 5 and 6) - These are estimates based on actual monitoring of the concentration of a chemical. The chemical's concentration in the waste stream multiplied by the flow rate or volume of the waste stream and its density yields the mass of the chemical released. Direct measurement is typically used to estimate releases via wastewater, solid waste, and hazardous waste, in part,

to ensure compliance with applicable environmental regulations. Although this estimation method should yield the most accurate results, only rarely are sufficient data available for direct measurement data to be applied without also resorting to other techniques (e.g., engineering calculations, mass balance). The frequency of the direct measurements should be taken into account when determining if monitoring data alone are sufficient for making a reasonable estimate. For example, if a facility has only gathered monitoring data once throughout the year, other methods may provide a more accurate estimate.

Note an indication that reportable chemical is below detection is not equivalent to stating that the chemical is not present. A concentration equivalent to half the detection limit should be used in subsequent calculations of release estimate quantities (i.e., if the limit of detection is 10 mg/l, release calculations should be performed assuming a concentration of 5 mg/l).

- **Mass balance** (basis of estimate code = C entered in Part II, Sections 5 and 6) - These are estimates based on a knowledge of the quantity of a chemical entering and leaving a process. An imaginary boundary is first drawn around the process, and all streams entering or leaving the boundary are identified. Assuming the amount of the chemical in the process input streams is known, a facility could calculate the quantity in waste streams by difference. A facility would need to account for any accumulation or depletion of the chemical within the mass balance boundary. The equation for mass balance is:

$$Input + Generation = Output + Amount\ Reacted + Accumulation$$

Using a mass balance to estimate a relatively small release of a chemical with a large throughput can lead to inaccurate, or even negative release estimates. Even a small percentage error in a large throughput could amount to a greater quantity than the release recalculated. When several large values each with their respective errors are used to calculate a small release, propagation of errors occurs which could yield a highly inaccurate value. Other techniques should be considered in these situations.

Mass balance estimates usually require engineering calculations or assumptions to be made (e.g., all usage results in air or water releases). These assumptions should be explicitly stated in the documentation and should be checked for reasonableness.

- **Emission factors** (basis of estimate code = E entered in Part II, Sections 5 and 6) - Release information derived from facilities or processes similar to yours can be used to estimate

releases. Emission factors come in two forms. The first expresses releases as a ratio of the amount of chemical released to facility throughput or production (e.g., 0.5 pound of Chemical X released per every pound of Material Y used). The second provides a typical concentration of a chemical in a waste stream (e.g., 0.1 mg/L of Chemical Z in wastewater from scrubbers). These factors, combined with process throughput or waste stream flow data, can be used as a basis for the release estimate. Many emission factors are available in *Compilation of Air Pollutant Emission Factors* (AP-42). AP-42 can be accessed via the Internet at http://www.epa.gov/ttn/chief/ap42etc.html. The basis of estimate code "E" can only be used for published Section 313 chemical-specific emission factors.

The reliability of emission factors depends on the quality and quantity of data used in their derivation, plus the similarity of the process to which they are applied and the quality of raw materials for the process.

- **Engineering calculations and assumptions** (basis of estimate code = O entered in Part II, Sections 5 and 6) - Estimates that do not fall into any of the above categories are considered engineering calculations. Typically, these estimates are based on standard engineering principles using properties of the chemicals involved, process data, or process knowledge. Example chemical properties include vapor pressure, solubility in water, and density. Example process parameters include temperature, pressure, and material flow rate. Other examples of engineering calculations would be the use of general equipment emissions factors or non-published, facility-developed emissions factors.

Reasonable Estimates: Significant Figures and Use of Range Codes

EPA recommends that two significant figures be used when reporting release and off-site transfer quantities in Part II, Sections 5 and 6 of Form R. Use of two significant figures may prevent errors from being reported on Form R, because a small calculating error may not impact the final reported quantity if the quantity is rounded to two significant figures. If you have reason to believe that your best estimate of a release quantity is particularly imprecise, you could use one significant figure or one of the range codes in reporting releases in Part II, Sections 5 and 6 of the Form R, if applicable:

Range Code A = 1 to 10 pounds
Range Code B = 11 to 499 pounds
Range Code C = 500 to 999 pounds

"NA" versus "0"

If you have no releases of a Section 313 chemical to a particular medium, report either "NA," not applicable, or "0," as appropriate. Report "NA" only when there is no possibility a release could have occurred to a specific medium or off-site location. If a release to a specific medium or off-site location could have occurred, but either did not occur or the annual aggregate release was less than 0.5 pounds, report zero. However, if you report zero releases, a basis of estimate must be provided. If use of the Section 313 chemical began in the reporting year, enter "NA" as the production ratio or activity index (Part II, Section 8.9 of the Form R).

For example, if nitric acid is involved in the facility's processing activities but the facility neutralizes the wastes to a pH of 6 or above, then the facility reports a "0" release for the Section 313 chemical. If the facility has no underground injection well, "NA" would be written in Part I, Section 4.10 and checked in Part II, Section 5.4.1 and 5.4.2 of Form R. Also, if the facility did not use the Section 313 chemical in the previous year, the facility would have no basis to develop a production ratio or activity index, "NA" would be checked in Part II, Section 8.9 of Form R.

REPORTING RELEASES IN FORM R, PART II

The following sections discuss the types of release reporting required on the Form R. Releases must be partitioned into land and air releases and should not be inadvertently "double counted." For example, a single wastewater discharge should not be listed as both a release to water (on-site) and a discharge to a POTW (off-site), nor should a release to land be listed as a release to both land (on-site) and a transfer to an off-site landfill. Also, subsequent releases from land (such as a leak from an impoundment) to groundwater is included as a land release in the year the leakage occurred. No reporting is required past the year in which it occurred. Even if it leaches out to ground water in the next year.

It is important to note that historical releases are not included in release reporting. For example, contamination around an underground storage tank (UST) is discovered, but there is no active leak from the tank. If you know that the contamination occurred during the reporting year (RY), then report the leak as a release to land. However, if the leak did not occur during the RY, it should not be included in release reporting.

Finally, the amount of leaks or spills onto pads or containment areas should not automatically be reported as released to land. The amount should be considered as treated or disposed depending on type of disposal activity. After releases to air, amounts cleaned up and disposed of off-site,

amounts recycled, and amounts released to water are considered, then the amount remaining on the pad is considered to be released to land. Amounts spilled into containment that are directly reused within the same reporting year without requiring treatment prior to reuse are not subject to release reporting.

Fugitive or Non-Point Emissions (Part II, Section 5.1 of Form R)

Fugitive emissions can occur from almost any part of a facility's operation. Potential sources include the following:

- Normal leakage of valves, pump seals, flanges, connectors, and other devices
- Sampling, Packaging, Loading, and unloading of chemicals
- Cleaning and maintenance activities such as blowing out pipes
- Containers of raw materials, intermediates, or wastes
- Storage piles and spills
- Evaporation from cooling towers, ponds, surface impoundments, and on-site wastewater management systems (including on-site sewers)
- Drum residues

Where actual monitoring or measurement data are not available, data sources and calculation methods that could be employed in estimating fugitive emissions include the following:

- Industrial Hygiene monitoring data
- AP-42 emissions factors (listed in Tables 4-1 and 4-2)

Clearinghouse for Inventories and Emission Factors (CHIEF)

CHIEF is designed to provide access to tools for estimating emissions of air pollutants and performing air emission inventories. It serves as EPA's central clearinghouse for the latest information on air emission inventories and emission factors. Emission estimation data bases, newsletters, announcements and guidance on performing inventories will be included in CHIEF. Tools for estimating emissions such as AP-42, WATER8, CHEMDAT8, and TANKS can be downloaded from this bulletin board system. CHIEF is located on the world wide web at http://www.epa.gov/ttn/chief/.

CHEMDAT8

Analytical models have been developed to estimate emissions of organic compounds via various pathways from wastewater and waste management units. Some of these models have been assembled into a spreadsheet called CHEMDAT8 for use on a PC. A user's guide for CHEMDAT8 is also available. Area emission sources for which models are included in the spreadsheet are as follows: nonaerated impoundments, which include surface impoundments and open top wastewater treatment (WWT) tanks; aerated impoundments, which include aerated surface impoundments and aerated WWT tanks; disposal impoundments, which include nonaerated disposal impoundments; land treatment; and landfills. These models can be used to estimate the magnitude of site air emissions for regulatory purposes. The CHEMDAT8 program and manual can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/software.html#water8

- SOCMI emission factors (listed in Table 4-3)
- Facility-specific emission factors
- Mass balance (for volatile solvents)
- EPA models such as WATER8 for wastewater management systems
- Data from a leak detection and repair (LDAR) program
- Engineering calculations
- CHEMDAT8 AND TANKS

WATER8

A computer program, WATER8, is available for estimating the fate of organic compounds in various wastewater treatment units, including collection systems, aerated basins, and other units. WATER8 is written to run under DOS without the need to purchase other programs. WATER8 contains useful features such as the ability to link treatment units to form a treatment system, the ability for recycle among units, and the ability to generate and save site-specific compound properties. The WATER8 program and users manual can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/software.html#water8.

Stack or Point-Source Air Emissions (Part II, Section 5.2 of Form R)

Point-source air emissions can occur from numerous pieces of process equipment throughout a facility. Potential sources include the following:

- Air pollution control devices such as scrubbers, condensers, baghouses
- Storage tanks, process tanks, and waste tanks
- Process vessels such as reactors and distillation columns

Where actual monitoring or measurement data are not available, data sources and calculation methods that could be employed in estimating stack or point source emissions include the following:

- Air emission inventories
- Air permit applications
- Process and production data

TANKS

The TANKS program is designed to estimate emissions of organic chemicals from several types of storage tanks. The calculations are performed according to EPA's AP-42, Chapter 12. After the user provides specific information concerning a storage tank and its liquid contents, the system produces a report which estimates the chemical emissions for the tank on an annual or partial year basis. The user can also determine individual component losses by using one of the specification options available in the program.

The TANKS program relies on a chemical database of over 100 organic liquids and a meteorological database which includes over 250 cities in the United States; users may add new chemicals and cities to these databases by providing specific information through system utilities. On-line help provides documentation and user assistance for each screen of the program. The TANKS program and manual can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/tanks.html.

- Emission factors from EPA and commercial models
- Engineering calculations

Wastewater Discharges (Part II, Section 5.3 and 6.1 of Form R)

Discharges to a stream or water body are reported in Part II, Section 5.3 of Form R, while transfers to Publicly Owned Treatment Works (POTWs) are reported in Part II, Section 6.1 of Form R. Because the release estimation approach is similar for both types of wastewater discharges, they are discussed here together.

A facility that discharges or has the potential to discharge water containing regulated wastes must operate under the terms of Federal, State, and/or local permits, such as a NPDES direct discharge permit, or a POTW indirect discharge agreement. The permit(s) or agreement usually require measurements of the water volume and monitoring and analyses of some generalized wastewater parameters including concentrations of various constituents. In some cases, the constituent analyses required for permit compliance includes Section 313 chemicals. In these instances, releases can be calculated by multiplying the volume of wastewater released by the concentration of the chemical released. Releases discharged to a POTW should be reported as off-site transfers on Part II, Section 6.1 of Form R.

Based on the concentration and wastewater flow data available, an estimate of discharges to water can be calculated. Facilities should calculate the daily average discharges of a reportable Section 313 chemical in pounds and must use those estimates to determine the annual discharge in pounds per year. Using the daily concentration data available for the reportable chemical combined with the wastewater flow data for each of the sampling dates, calculate an estimate of pounds per day for each sampling date. After the calculations are made for each monitoring point (e.g., daily, monthly), the pounds discharged are averaged to determine an average daily discharge amount which would be multiplied by the number of days discharges were possible (e.g., 365 days a year).

If no monitoring data exist, NPDES permit applications or POTW agreements may provide information useful to estimating releases. Otherwise, process knowledge (or in some cases, mass balance) needs to be utilized to develop an estimate.

Discharges of listed acids may be reported as zero if all discharges have been neutralized to pH 6 or above. If wastewater containing a listed acid is discharged below pH 6, then releases of the acid must be calculated and reported. For more information on calculating such discharges of acids, see EPA's *Estimating Releases of Mineral Acid Discharges Using pH Measurements* (EPA745/F-97-003, June 1991).

Example Calculation of Yearly Wastewater Discharge

A facility has monitoring data on discharges to water of xylene, a listed Section 313 chemical, and a Form R report is required. In this example, monitoring data on this chemical are only available for two days in the year. The daily quantities of pounds of xylene released for those two dates would then be divided by the number of sample dates to determine the daily average for the whole reporting year, which would be used to estimate the annual discharge of xylene in wastewater:

Date	Concentration (mg/l)	Flow (MGD)	Daily Discharge
3/1/96	1.0	1.0	8.33 lbs.
9/8/96	0.2	0.2	0.332 lbs.

Annual Calculation:
8.33 lbs. + 0.332 lbs./2 days x 365 days/year = 1580.82 lbs/yr

Underground Injection On-Site (Part II, Section 5.4 of Form R)

A facility that has an underground injection well for waste disposal is regulated by Safe Drinking Water Act (SDWA) permits. The permit(s) usually require measurements of the waste volume and analyses of some generalized waste parameters including concentrations of various constituents. When the constituents for which the permit requires analyses include reportable Section 313 chemicals, releases via underground injection can be calculated by multiplying the volume of waste injected by the concentration of the chemical in the waste. Facilities must report amounts of Section 313 chemicals injected into Class I wells (Part II, Section 5.4.1 of Form R) and amounts injected into Class II-V (Part II, Section 5.4.2 of Form R).

Release to Land On-Site (Part II, Section 5.5 of Form R)

In most circumstances involving the disposal of many Section 313 chemicals, land disposal is regulated by RCRA and state regulations. In part II, Section 5.5, TRI is concerned with the total amount of the specified reportable Section 313 chemical released to land, regardless of the potential for the chemical to leach from the disposed waste.

On-site disposal includes disposal in an on-site RCRA Subtitle C landfill (Part II, Section 5.5.1A of Form R), disposal in other on-site landfills (Part II, Section 5.5.1B of Form R), disposal in a land treatment/application farming unit (Part II, Section 5.5.2 of Form R), and disposal in a surface impoundment (Part II, Section 5.5.3 of Form R). Data concerning these types of "intentional" on-site disposal are usually readily available because facilities are required to monitor the quantity of waste and will have a waste profile that describes typical concentration ranges for waste constituents. In some cases, concentrations of constituents in the waste have been measured. If on-site waste treatment occurs prior to on-site land disposal, the treatment efficiency and a mass balance can be conducted to determine the quantity of a chemical that is land disposed. For example, a facility can determine the amount of the chemical present in the untreated waste, determine the efficiency of treatment in removing or destroying the chemical in the waste, account for other releases (i.e., fugitive emissions, leaks, spills, accidental releases, losses to air pollution control devices, etc.), and determine that the remainder is the quantity of the chemical land disposed.

Releases to land on-site/other disposal (Part II, Section 5.5.4 of Form R) include the amount of chemical released to land on site not covered by any of the above categories and include spills, leaks, or "unintentional" disposal, such as metal dust that is deposited onto soil. Incident logs or spill reports can provide useful information.

Transfers in Wastes to Other Off-site Locations (Part II, Section 6.2 of Form R)

Similar to on-site disposal, data concerning off-site waste transfers are usually readily available because facilities are required to monitor the quantity of waste and either measure concentrations of chemicals or develop a waste profile that describes typical concentration ranges. Under Section 313, off-site transfer estimates are based on the final, known disposition of the reportable Section 313 chemical in the waste sent off-site for further waste management. For example, a reportable Section 313 metal is contained in a waste solvent sent off-site for energy recovery purposes. Even though the waste stream as a whole has a sufficient heat value to warrant energy recovery, metals do not have a significant heat value and, therefore, cannot be combusted for

energy recovery. Unless the facility had additional information on the fate of the reportable Section 313 metal in this waste, the facility must assume the metal is being disposed and should report the quantity sent off-site accordingly in Part II, Sections 6.2 and 8.1 of Form R.

Even wastes that were minimally processed, such as wastes that were repackaged, such as small containers removed from a lab pack that were not otherwise opened or managed, may need to be reported if the article exemption (as discussed in Section 2) is not applicable.

On-site Waste Treatment Methods and Efficiency (Part II, Section 7A of Form R)

In Section 7A, the following information must be reported:

- General waste stream types containing the Section 313 chemical being reported;
- Waste treatment methods or sequence used on all waste streams containing the Section 313 chemical;
- Range of concentration of the Section 313 chemical in the influent at the first step in a waste treatment system;
- Efficiency of the waste treatment method or sequence in destroying or removing the Section 313 chemical; and

Estimating Releases for Accidental Losses

Leaks, spills, and drips from the loading and transfer of chemicals received at the facility should be considered and reported in your release estimates. Data concerning specific incidents (such as notification reports or incident logs) should be included in release estimates. Equations found in Section 6 of EPA's *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form* (EPA 560/4-88-002, December 1987), provide guidance on calculating releases from chemical spills or leaks, including liquid discharges, fraction of discharge flashed, vaporization, two-phase discharges, and gas discharges.

EXAMPLE: A facility uses more than 10,000 pounds of glycol ether to be mixed into fuel as an additive. While unloading on a windless overcast day, a 55 gallon drum containing glycol ether is spilled. Most of the spill remains on the pad, however, an estimated ten percent flows off the pad and onto the soil. Absorbent material used to remove the glycol ether from the concrete pad is transferred offsite for disposal. How would these releases be reported on the Form R? The density of glycol ether is 8.6 pounds per gallon, and the vapor pressure is 0.10 mm Hg at 68° F.

Quantity spilled = 55 gal x 8.6 lbs./gal = 473 lbs.
Amount spilled onto pad = 473 x 90% = 425.7 lbs.
Amount spilled onto soil = 473 x 10% = 47.3 lbs.

Air emissions of glycol ether are expected to be negligible due to the low vapor pressure and environmental conditions, provided response and cleanup are immediate. Therefore, the total amount spilled onto the concrete pad (430 pounds) is transferred offsite and should be reported in Sections 6.2, and the total amount spilled onto the soil (50 pounds) should be reported in Section 5.5.4, other disposal.

- Indication of whether the efficiency estimate was based on actual operating data.

Report any waste treatment step through which the reportable Section 313 chemical passes regardless of treatment efficiency. Report all non-identical parallel steps and all sequential steps.

Waste treatment for the purpose of Section 7A is defined as removal of the Section 313 chemical from the waste through destruction, biological degradation, chemical conversion, or physical removal. Note that this definition of waste treatment is broader than the definition used in Part II, Section 8 of Form R (discussed later). Section 7A treatment efficiency is calculated as follows:

$$percent\ efficiency = \frac{input - output}{input} \times 100\%$$

If your facility has a measurement of the pollutant concentration of input and output at the treatment unit, these data should be used to calculate the treatment efficiency. If these measurements are not available, data from literature or the equipment manufacturer can be used for estimation purposes. Equipment manufacturer data on treatment efficiencies often represent ideal operating conditions with an ideal waste matrix. Thus, you may want to adjust such data to account for downtime, process upsets, and other less than optimum conditions during the year that would result in lower efficiencies.

Estimates of treatment efficiencies by process for EPCRA Section 313 chemicals are available from the ATTIC database via modem from ATTIC by calling data number (513) 569-7610. Additional information can be obtained by calling the ATTIC Hotline at (513) 569-7272.

On-site Energy Recovery Processes (Part II, Section 7B of Form R)

In Section 7B, methods used to combust the Section 313 chemical in wastes for energy recovery are reported. Two conditions need to be met to report the combustion of a Section 313 chemical as energy recovery: (1) the chemical must have a heat of combustion high enough to support combustion (e.g., 5,000 BTU per pound or greater), and (2) must be combusted in a unit equipped with an energy recovery device, such as a waste heat boiler.

On-site Recycling Processes (Part II, Section 7C of Form R)

In Section 7C, methods used to recycle the Section 313 chemical in wastes are reported.

Source Reduction and Recycling Activities (Part II, Section 8 of Form R)

The following discussion for Sections 8.1 through 8.7 applies to the current reporting year (i.e., column B of Section 8 of the Form R).

Quantity Released (Part II, Section 8.1 of Form R)

The quantity reported in Section 8.1 is the quantity reported in all of Section 5 plus the quantity reported as sent off-site for disposal in Section 6.2 minus the quantity reported in Section 8.8 that was released or transferred off site for disposal:

§8.1 = §5 + §6.2 (disposal only) - §8.8 (release or off-site disposal only)

Section 6.2 disposal codes are M10, M71, M72, M73, M79, M90, M94, and M99. In addition, EPCRA Section 313 listed metals in waste streams sent off-site to POTWs or other off-site locations for treatment for destruction should be reported in Section 8.1, unless the facility has knowledge that the metal is being recovered.

Quantity Used for Energy Recovery On-site (Part II, Section 8.2 of Form R)

Estimate a quantity of the Section 313 chemical in wastes combusted for energy recovery on-site. This estimate should be the quantity of the chemical combusted in the process for which codes were reported in Section 7B. Test data from trial burns or other monitoring data may be used to estimate the quantity of the Section 313 chemical combusted for energy recovery purposes. If monitoring data are not available, vendor specifications regarding combustion efficiency may be used as they relate to the reportable Section 313 chemical. A quantity must be reported in Section 8.2 when a method of on-site energy recovery is reported in Section 7B and vice versa. Two conditions need to be met to report the combustion of a Section 313 chemical as energy recovery: the chemical (1) must have a heat of combustion high enough to support combustion (e.g., 5,000 BTU or greater), and (2) must be combusted in a unit equipped with an energy recovery device, such as a waste heat boiler. Note that "NA" should be reported for Section 313 chemicals which are Halons (e.g., CFCs) and metals that do not have a heat of combustion sufficient to sustain combustion.

Quantity Used for Energy Recovery Off-site (Part II, Section 8.3 of Form R)

The quantity reported in Section 8.3 is the quantity reported in Section 6.2 for which energy recovery codes are reported. Section 6.2 energy recovery codes are M56 and M92. If a quantity is reported in Section 8.8, subtract any associated off-site transfers for energy recovery:

§8.3 = §6.2 (energy recovery) - §8.8 (off-site energy recovery)

Quantity Recycled On-site (Part II, Section 8.4 of Form R)

Estimate a quantity of the Section 313 chemical recycled in wastes on-site. This estimate should be the quantity of the chemical recycled in the process for which codes were reported in Section 7C. A quantity should be reported in Section 8.4 when a method of on-site recycling is reported in Section 7C and vice versa. To estimate this quantity, you should determine if operating data exist which indicate a recovery efficiency and use that efficiency value combined with throughput data to calculate an estimate. If operating data are unavailable, use available vendor specifications.

Quantity Recycled Off-site (Part II, Section 8.5 of Form R)

The quantity reported in Section 8.5 must be the same as the quantity reported in Section 6.2 for which recycling codes are reported. Section 6.2 recycling codes are M20, M24, M28, and M93. If a quantity is reported in Section 8.8, subtract any associated off-site transfers for recycling:

§8.5 = §6.2 (recycling) - §8.8 (off-site recycling)

Quantity Treated On-site (Part II, Section 8.6 of Form R)

Waste treatment in Section 8 is limited to the destruction or chemical conversion of the Section 313 chemical. The quantities reported in Section 8.6 will be those treated in a subset of the processes for which codes were reported in Section 7A, where treatment includes physical removal from a waste stream. To estimate this quantity, you should determine if operating data exist which indicate a treatment (e.g., destruction or chemical conversion of Section 313 chemical) efficiency and use that efficiency value combined with throughput data to calculate an estimate. If operating data are unavailable, use available vendor specifications. Section 7A must be completed if a quantity is entered in Section 8.6.

Quantity Treated Off-site (Part II, Section 8.7 of Form R)

The quantity reported in Section 8.7 must be the sum of the quantities reported in Section 6.2, for which treatment codes are reported, and the quantities reported in Section 6.1, which were sent to a POTW. Section 6.2 waste treatment codes are M40, M50, M54, M61, M69, and M95. If a quantity is reported in Section 8.8, subtract any associated off-site transfers for treatment:

§8.7 = §6.1 + §6.2 (treatment) - §8.8 (off-site treatment).

Because metals cannot be destroyed or chemically converted, metals cannot be reported as treated in Section 8. Quantities of metals reported in Section 6.1 and 6.2 as being treated should be reported in Section 8.1 (Quantity released), unless the facility has knowledge that the metal is being recovered.

Quantity Released to the Environment as a Result of Remedial Actions, Catastrophic Events, or One-time Events Not Associated with Production Processes (Part II, Section 8.8 of Form R)

The quantity reported in Section 8.8 is the quantity of the Section 313 chemical released directly into the environment or sent off-site for recycling, waste treatment, energy recovery, or disposal during the reporting year due to any of the following events:

(1) Remedial actions
(2) Catastrophic events such as earthquakes, fires, or floods
(3) One-time events not associated with normal or routine production processes

The quantity reported in Section 8.8 should not be included with quantities reported in Part II Sections 8.1 through 8.7 of Form R, but should be included in Part II , Sections 5 and 6 of Form R as appropriate.

Spills that occur as a routine part of production operations and could be reduced or eliminated by improved handling, loading, or unloading procedures are included in the quantities reported in Section 8.1 through 8.7 as appropriate. Releases and off-site transfers from remediation of a Section 313 chemical or an unpreventable accident unrelated to production (such as a hurricane) that cause a reportable Section 313 chemical to be released are reportable in Section 8.8.

On-site treatment, energy recovery, or recycling of Section 313 chemicals in wastes generated as a result of remedial actions, catastrophic events, or one-time events not associated with production processes are not reported in Part II, Section 8.8 nor Sections 8.1 through 8.7 of Form R.

SECTION 5
CALCULATING RELEASE ESTIMATIONS AT PETROLEUM BULK STATIONS AND TERMINALS

In Section 4, the tools and techniques available for estimating releases to the environment and reporting disposition of wastes (including transfers off-site, land disposal, underground injection, and wastewater discharges) were discussed. This section provides guidance on how petroleum bulk stations and terminals should report these releases and waste dispositions on Form R. Typical operations and the resulting wastes and releases are discussed.

Petroleum and petroleum products are managed in marketing facilities known as bulk stations and terminals. These terminals are widespread and diverse with varying degrees of complexity. Product lines include: crude oil, motor gasoline, diesel, heating fuel, aviation jet fuel, asphalt, and liquid petroleum hydrocarbons.

Petroleum bulk stations and terminals should evaluate their activities on a site-specific basis. This guidance is a starting point for considering possible releases and estimation methods. Developing accurate and comprehensive release estimates requires the consideration of all possible release pathways. While differing in some respects, all petroleum bulk terminals share the fundamental operating characteristics diagramed in Figure 5-1.

The primary activity at petroleum bulk terminals is the bulk storage (i.e., greater than 10,000 gallons) and transfer of petroleum products prior to further distribution in commerce. The petroleum products enter the facility in bulk quantities via pipeline, rail car, tank truck, or vessel, depending on the location of the facility. While on site, the petroleum is stored in large storage tanks and then subsequently dispensed into tanker trucks, rail cars, or pipelines to be distributed in commerce. The facility also may engage in mixing or blending of the petroleum products prior to distribution off-site.

In addition, releases from operations in which petroleum product is not brought on site to be stored and redistributed off site are not subject to Section 313 reporting. For example, a storage facility may send tanker trucks to pick up gasoline from a refinery and transport it directly to the gasoline station without bringing the fuel to be stored on site at the storage facility. The releases from these types of transfers are not reported on the storage facility's Form R.

The following operations, common to many petroleum bulk terminals, may result in releases containing Section 313 chemicals.

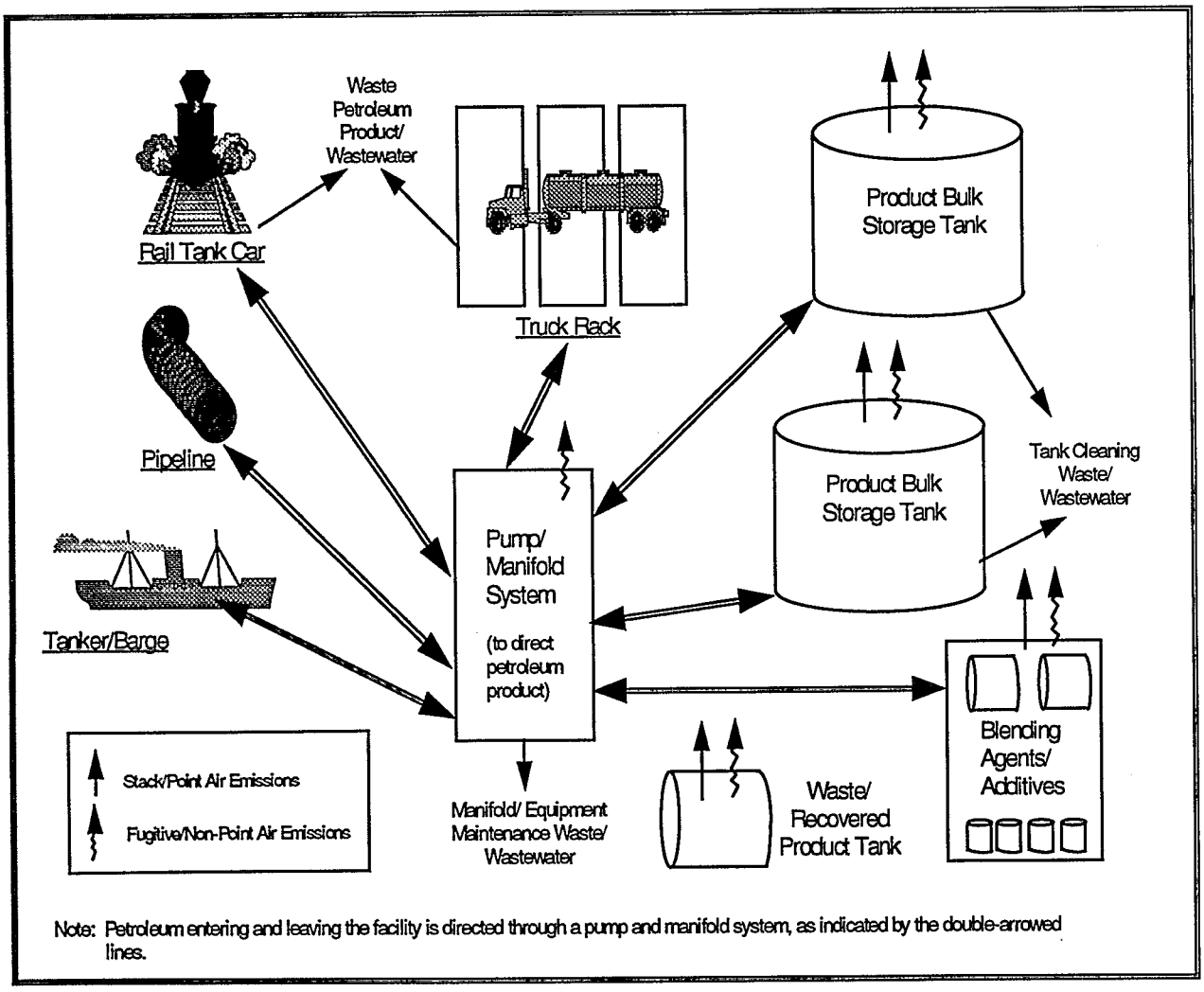


Figure 5-1: Petroleum Bulk Storage Facility

LOADING/UNLOADING PETROLEUM PRODUCT

Some potential releases or waste generation sources associated with the loading and unloading of petroleum products are:

- Fugitive emissions during loading/unloading of petroleum product (§5.1)

- Spills or leaks of petroleum product (§5.5)
- Waste petroleum product sent off-site for further waste management (§6.2)
- Recycling of recovered petroleum product on-site (§7C).

Petroleum bulk terminals receive petroleum products primarily through pipeline, rail car, tank truck or directly from a barge if the terminal is located along a shoreline. A facility is responsible for reporting releases and other waste management information for Section 313 chemicals that occur during loading or unloading of a transportation vehicle, including trucks, railcars, ships, and airplanes provided certain activity thresholds have been exceeded for that chemical. Releases of a Section 313 chemical from a transportation vehicle that occur while the vehicle is still under "active shipping papers" is exempt from Section 313 requirements (EPCRA Section 327). However, once the facility takes possession of the petroleum product (e.g., signing shipping papers), the facility becomes responsible for reporting releases of a Section 313 chemical, including those that occur during loading or unloading of a transportation vehicle while the vehicle is on property owned or operated by the facility.

Loading Losses

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations. These releases are reported as fugitive air emissions in Section 5.1 of the Form R. Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are composed of vapors formed in the empty tank by evaporation of residual product from previous loads, vapors transferred to the tank as product is being unloaded, and vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations depends on parameters such as the physical and chemical characteristics of the previous and new cargo and the method of loading and unloading the previous and new cargo.

The principal methods of cargo carrier loading are splash loading, submerged fill pipe loading, and bottom loading. In the splash loading method, the fill pipe dispensing the cargo is lowered only part way into the cargo tank. Significant turbulence and vapor/liquid contact occur during splash loading and result in high levels of vapor generation and loss. In submerged fill pipe loading, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. In both of these submerged loading methods, liquid turbulence is controlled which results in much lower vapor generation.

The use of vapor recovery equipment can reduce loading emissions. Vapor recovery equipment captures organic vapors that are displaced during loading operations and either pipes the recovered product to a storage unit or to a thermal oxidation unit where the vapor is combusted. Chapter Five, Section Two, of *Compilation of Air Pollutant Emission Factors (AP-42)* and Section Three of *Estimating Releases and Waste Treatment Efficiencies For the Toxic Chemical Release Inventory Form* (EPA 560/4-88-002, December 1987) provide detail information on the calculation of total VOC vapor emissions during the transportation and marketing of petroleum liquids.

Spills/Overfills

Another common release of petroleum product is the spilling of petroleum product during loading and unloading cargo tanks or spills that occur during storage tank loading.

Spills may occur at hose/nozzle connections or as a result of line ruptures and valve failures. While tank trucks and rail cars usually do not have catchment devices, the areas used for their loading and off loading are normally equipped with some type of secondary containment designed to hold the contents of at least one tank truck or rail car. New storage tanks and truck/trailer tanks often have overfill alarms and cutoff devices; however, these may fail. Older tanks may not be similarly equipped; therefore, operational procedures must be carefully followed to preclude the inadvertent overfilling of these tanks. Air emissions from spills are reported in Section 5.1 as fugitive emissions. Spilled product that is recovered and sent to an on-site unit for recycling is reported in Section 7C. Spilled material remediated and sent off-site for disposal is reported in Section 6.2 as an off-site transfer. Spills that remain on the pad or secondary containment is reported in Section 5.5. More guidance on calculating releases from spills can be found in Section Six of *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form* (EPA 560/4-88-002, December 1987).

STORAGE OF PETROLEUM PRODUCT

Some potential releases or waste generation sources associated with the storage and distribution of petroleum product are:

- Fugitive emissions from equipment leaks (§5.1)
- Point source emissions from storage tanks (§5.2)
- Leaks, drips, and accidental releases from tanks and equipment (§§5.1, 5.3, 5.5.4, and/or 6.1)

- Recovery of spilled petroleum product on site (§7C)
- Waste petroleum product sent off site for further waste management (§6.2).

Tanks

Petroleum bulk stations and terminals typically store large quantities of fuel on site. Emissions from storage tanks are a result of evaporative losses during storage (known as breathing losses or standing storage losses) and evaporative losses during filling and emptying operations (known as working losses). Under EPCRA Section 313, storage tank emissions are reported as stack or point air emissions on the Form R in Section 5.2. Storage tanks may have a capacity up to 80,000 barrels (i.e., 3.2 million gallons; one barrel equals 42 gallons). These tanks have roofs to control the vapor level and a seal to minimize water entering the tank. A series of pipes are connected to the tank for product transport and for water that is drained out of the tank. There are four common tank designs used for storing petroleum products: fixed roof (vertical and horizontal), external floating roof, domed external (or covered) floating roof and internal floating roof. A brief description of each tank is provided below.

(1) Fixed Roof Tanks

This type of tank consists of a cylindrical steel shell with a permanently affixed roof, which may vary in design from cone- or dome-shaped to flat. Losses from fixed roof tanks are caused by changes in temperature, pressure, and liquid level. Fixed roof tanks are either freely vented or equipped with a pressure/vacuum vent.

Horizontal fixed roof tanks are constructed for both above-ground and underground service and are usually constructed of steel, steel with a fiberglass overlay, or fiberglass-reinforced polyester. Horizontal tanks are generally small storage tanks with capacities of less than 40,000 gallons. Horizontal tanks are constructed such that the length of the tank is not greater than six times the diameter to ensure structural integrity. Horizontal tanks are usually equipped with pressure-vacuum vents, gauge hatches and sample wells, and manholes to provide access to these tanks. In addition, underground tanks may be cathodically protected to prevent corrosion of the tank shell.

The potential emission sources for above-ground horizontal tanks are the same as those for vertical fixed roof tanks. Emissions from underground storage tanks are associated mainly with changes in the liquid level in the tank. Losses due to changes in temperature or barometric pressure are minimal for underground tanks because the surrounding earth limits the diurnal temperature change, and changes in the barometric pressure result in only small losses.

(2) External Floating Roof Tanks

A typical external floating roof tank (EFRT) consists of an open-topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings, and rim seal system. With all types of external floating roof tanks, the roof rises and falls with the liquid level in the tank. External floating decks are equipped with a rim seal system, which is attached to the deck perimeter and contacts the tank wall. The purpose of the floating roof and rim seal system is to reduce evaporative loss of the stored liquid. Some annular space remains between the seal system and the tank wall. The seal system slides against the tank wall as the roof is raised and lowered. The floating deck is also equipped with fittings that penetrate the deck and serve operational functions. The external floating roof design is such that evaporative losses from the stored liquid are limited to losses from the rim seal system and deck fittings (standing storage loss) and any exposed liquid on the tank walls (withdrawal loss).

(3) Internal Floating Roof Tanks

An internal floating roof tank (IFRT) has both a permanent fixed roof and a floating roof inside. There are two basic types of internal floating roof tanks: tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns. The deck in internal floating roof tanks rises and falls with the liquid level and either floats directly on the liquid surface (contact deck) or rests on pontoons several inches above the liquid surface (noncontact deck). The majority of aluminum internal floating roofs currently in service have noncontact decks. Both contact and noncontact decks incorporate rim seals and deck fittings for the same purposes previously described for external floating roof tanks. Evaporative losses from floating roofs may come from deck fittings, nonwelded deck seams, and the annular space between the deck and tank wall. In addition, these tanks are freely vented by circulation vents at the top of the fixed roof. The vents minimize the possibility of organic vapor accumulation in the tank vapor space in concentrations approaching the flammable range.

(4) Domed External Floating Roof Tanks

Domed external (or covered) floating roof tanks have the heavier type of deck used in external floating roof tanks as well as a fixed roof at the top of the shell like internal floating roof tanks. Domed external floating roof tanks usually result from retrofitting an external floating roof tank with a fixed roof. This type of tank is very similar to an internal floating roof tank with a welded deck and a self supporting fixed roof. As with the internal floating roof tanks, the function of the

fixed roof is not to act as a vapor barrier, but to prevent precipitation from accumulating on the floating roof. The type of fixed roof most commonly used is a self supporting aluminum dome roof, which is of bolted construction. Like the internal floating roof tanks, these tanks are freely vented by circulation vents at the top of the fixed roof. The deck fittings and rim seals, however, are identical to those on external floating roof tanks. In the event that the floating deck is replaced with the lighter IFRT-type deck, the tank would then be considered an internal floating roof tank.

Emissions from petroleum in storage occur because of evaporative loss of the liquid during its storage and as a result of changes in the liquid level. External and internal floating roof tanks are emission sources because of evaporative losses that occur during standing storage and withdrawal of liquid from the tank. Standing storage losses are a result of evaporative losses through rim seals, deck fittings, and/or deck seams.

A number of equations used to calculate total VOC losses in pounds per year from storage tanks can be found in *AP-42*, Chapter 7, Section 7.1.3. The program TANKS, mentioned in Section 4 of this manual, can also aid in calculating emissions from storage tanks. The total losses from storage tanks are equal to the sum of the standing storage loss and working loss. Variables such as tank design, liquid temperature, and wind velocity are taken into account when determining standing storage loss and working loss. The emission equations for fixed-roof tanks in AP-42 were developed for vertical tanks; however, the equations can also be used for horizontal tanks by modifying the tank parameters as specified in AP-42.

Once the total volatile organic compound (VOC) loss is calculated, you can then determine the emission rate of each constituent in the vapor. In general, the emission rate for individual components can be estimated by multiplying the weight fraction of the constituent in the vapor by the amount of total VOC loss. The weight fraction of the constituent in the vapor can be calculated using the mole fraction and the vapor pressure of the constituent (equations found in AP-42). The weight percent can also be obtained from the SPECIATE database. The SPECIATE data base contains organic compound and particulate matter speciation profiles for more than 300 source types. The profiles attempt to break down the total VOC or particulate emissions from a particular source into the individual compounds. The SPECIATE database can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/software.html#speciate.

Releases of petroleum product may occur as a result of tank failure. Federal regulations require that storage tanks be outfitted with secondary containment. The secondary containment, typically a bermed area, must be large enough to carry 110-150% of the capacity of the tank and hold it for a period of 72 hours. Petroleum product that has spilled or leaked into the containment area may

be reported in Section 7C if recovered and reinserted into the product tank, reported in Section 6.2 if sent off-site as for further waste management, and/or reported in Section 5.5 if the spill remains on the pad or containment area.

Water may condense inside the tank and will naturally fall to the bottom of the tank. The water layer settles on the bottom of the tank and is drained from the tank periodically and managed as wastewater. This wastewater may contain benzene, cyclohexane, ethylbenzene, toluene, 1,2,4-trymethylbenzene, and xylene. The wastewater from the tank is either drained and discharged or is directed to a tank for subsequent fuel recovery. In addition, precipitation often accumulates in the secondary containment and must be drained as often as necessary depending on the weather. This wastewater also may be drained to water ditches or oil/water separators regulated by the state. Reportable Section 313 chemicals present in wastewater that is discharged off-site is reported in Section 5.3 or Section 6.1. Reportable Section 313 chemicals present in wastewater that is sent through a fuel recovery system is reported in Section 7C.

There also will be fugitive emissions from flanges and valves associated with the tank. These emissions are discussed below.

Equipment

Emissions will also occur from equipment leaks at petroleum bulk stations and terminals. Integral to the distribution system is equipment such as pumps, valves, connectors, loading arms, compressors, drains, and meters. The pump-manifold area is a system of valves, pumps, and piping that direct the petroleum product to various units. In general, product entering and leaving the facility will pass through this system. Emissions from equipment leaks are reported in Section 5.1 for fugitive or non-point air emissions. The document, *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017) provides further guidance on estimating emissions from equipment leaks. That document details four approaches to estimating total organic emissions from equipment leaks in the petroleum industry. One approach, the average emission factor approach, allows the use of average emission factors developed by EPA in combination with unit-specific data including the number of each type of component in a unit, the service each component is in, the toxic organic compound (TOC) concentration of the stream (and volatile organic compound (VOC) or hazardous air pollutant (HAP) concentrations if speciation is to be performed), and the time period each component was in that service. Table 5-1 provides average emission factors for petroleum marketing terminals.

Table 5-1 Marketing Terminal Average Emission Factors

Equipment Type	Service	Emission Factor (kg/hr/source) for total organic compounds (TOC)
Valves	Gas	1.3E-05
	Light Liquid	4.3E-05
Pumps	Gas	6.5E-05
	Light Liquid	5.4E-04
Others (compressors and others)[a]	Gas	1.2E-04
	Light Liquid	1.3E-04
Fittings (connectors and flanges)[b]	Gas	4.2E-05
	Light Liquid	8.0E-06

Source: *Protocol for Equipment Leak Emission Estimates*, November 1995

[a] The "other" equipment type should be applied for any equipment type other than fittings, pumps, or valves

[b] "Fittings" were not identified as flanges or non-flanged connectors; therefore, the fitting emissions were estimated by averaging the estimates from the connector and the flange correlation equations.

The general equation for estimating TOC mass emissions from an equipment leak using average emission factors is:

$$E_{TOC} = F_A * WF_{TOC} * N$$

where:

E_{TOC} = emission range of TOC from all equipment in the stream of a given equipment type (kg/hr) (this result would then be multiplied by 2.2 lb/kg to convert the value to pounds)

F_A = average emission factor for the equipment type (kg/hr/source)

WF_{TOC} = average weight fraction of TOC in the stream
N = number of pieces of equipment

And the equation for determining the emissions of a specific VOC in a mixture from equipment is:

$$E_x = E_{TOC} * (WP_x/WP_{TOC})$$

where:

E_x = The mass emissions of organic chemical "x" (kg/hr)
E_{TOC} = The TOC mass emissions from the equipment (kg/hr)
WP_x = The concentration of organic chemical "x" in the equipment in weight percent
WP_{TOC} = The TOC concentration in the equipment in weight percent.

Figure 5-2 provides an example of calculating emissions from equipment leaks.

Figure 5-2: Calculation of Equipment Leak Emissions

At a petroleum storage facility, gasoline passes through a system containing 100 connectors. The gasoline contains 85 weight percent TOC. The gasoline is in contact with the connectors in the system for 8000 hours during the year. The weight percent of toluene in the gasoline is 5.6%. The emissions of TOC would be calculated as:

E_{TOC} = F_A * WF_{TOC} * N * (Number of hours in contact during the year)
= (0.000008 kg/hr/connector) (0.85) (100) (8000 hrs/year)
= 5.44 kg/year of TOC from connectors

The emissions of toluene from the connectors would be calculated as:

E_x = E_{TOC} * (WP_x/WP_{TOC})
= 5.44 kg/year * (0.056/0.85)
= 0.3584 kg/year of toluene from connectors

This figure would then be multiplied by 2.2 lbs./kg to convert to lbs./year: 0.7885 lbs./year of toluene released through the connectors.

Equipment failure may also result in leaks and discharges of petroleum product. As with spills of petroleum that may occur at other parts of the facility, the petroleum product may be recovered and reinserted in the storage tank, cleaned up with absorbent and sent off site for further waste management, and/or may remain in the environment on site.

MIXING OF PETROLEUM PRODUCT

Mixing operations may occur anywhere at the facility. Section 313 chemicals involved would include the components in fuel and the additives. Large facilities may store large containers of additives, and fugitive emissions may occur from these containers. Accidental spills of additives may occur as well. Releases from mixing operations may be reported as fugitive emissions in Section 5.1, as releases to the environment on site in Section 5.5, as disposal off-site in Section 6.2, and/or as recycled in Section 7C if the product is recovered. In addition, Section 313 chemicals in wastewater discharges related to spills should be reported in Sections 5.3 and/or 6.1.

TANK CLEANING AND EQUIPMENT MAINTENANCE

Some potential releases or waste generation sources associated with petroleum storage facility maintenance are:

- Discharge of non-hazardous wastewaters (§5.3 or §6.1)
- Fugitive emissions from wastewater accumulated on site and during tank roof landings (§5.1)
- Wastes sent off-site for further waste management (§6.2)
- On-site waste treatment (§7A)
- Recovery of petroleum in wastewater or sludge on site (§7C).

Tanks are cleaned if there is a change in service (e.g., from crude oil to gasoline), if the tank will undergo an upgrade, and prior to any significant internal inspections. API recommends that storage tanks be cleaned and inspected for leaks every 10 years. Large tanks are inspected infrequently, generally only every 10-20 years unless there are compelling circumstances for more frequent cleanings. Accumulated contaminants and heavy compounds settle in tank bottoms during normal storage, resulting in sludge. Storage of refined petroleum products may not result in heavy accumulation of sludge.

Emissions of Section 313 chemicals from tank cleaning or other activities that occur at the facility must be considered for release or other waste management reporting provided a threshold has

been exceeded elsewhere at the facility for that chemical. During cleaning operations, the tanks are drained down to remove and recover all product possible. Fugitive emissions may occur during tank roof landings. The remaining residue consists of a liquid and a solid phase. The liquid is primarily wastewater with small amounts of hydrocarbon. If the wastewater is treated prior to discharge, then the treatment of the wastewater would be reported in Section 7A. Section 313 chemicals in wastewater discharged to an on-site body of water or to a POTW is reported in Section 5.3 or Section 6.1 of the Form R. The rest of the residue consists of sludge composed of a mixture of sediments, heavier products, such as waxes and asphalt, and corrosion products, such as rust and scale, which can be recycled on site or sent off site. Sludge sent off site for further waste management is reported as an off-site transfer in Section 6.2. If the sludge is recycled on site, the tanks are washed with hot diesel and/or water. This mixture is vacuumed from the tank and sent to either a filter press or centrifuge to separate the hydrocarbons, water, and solids. The hydrocarbons are recovered, and water and other solid waste are disposed. The recovery of the hydrocarbons is reported as on-site recycling in Section 7C of the Form R. The disposal of water and solids are reported as transfers off-site in Sections 5.3, 6.1, and/or 6.2. Section 313 chemicals potentially released consist of the constituents in the products and/or tank construction materials. The Section 313 chemicals potentially present in tank sludges include benzene, cadmium, and chromium. In addition, any fugitive emissions from tank cleanings are reported in Section 5.1.

Secondary containment of the storage tanks and loading racks may collect rainwater runoff contaminated with petroleum and other constituents from equipment cleaning operations, leaks, and spills. The composition of this waste is highly variable. Fugitive emissions may occur from wastewater that is accumulated on site in secondary containment, sumps, or impoundments. Programs such as WATER8 or CHEMDAT8 can aid in determining fugitive emissions from these units. The wastewater may be reported as a discharge to an on-site body of water in Section 5.3 or a discharge to a POTW in Section 6.1. If the wastewater is treated prior to discharge, then the treatment of the wastewater would be reported in Section 7A. If petroleum is recovered from the wastewater, the Section 313 chemical recovered will be reported in Section 7C.

Amounts of leaked or spilled petroleum product that are immediately cleaned up and directly reused within the same reporting year are not subject to release reporting, provided that the material is not treated prior to reuse.

Section 313 chemicals undergoing a remediation activity are not being "manufactured," "processed," or "otherwise used;" therefore, they are not considered toward the reporting thresholds. However, these amounts may require consideration for release reporting for amounts released or otherwise managed if a threshold for the Section 313 chemical is exceeded elsewhere

at the facility. For example, a facility that is remediating soil and groundwater contaminated with lead must report the amounts of lead released, managed on-site, or transferred off-site only if the facility elsewhere manufactures, processes, or otherwise uses lead in amounts exceeding the applicable thresholds.

Releases that occur during the reporting year must be included in release reporting calculations. If soil and/or groundwater contamination from a current leaking unit is discovered, the release must be reported. Amounts of Section 313 chemicals in contaminated soil and/or groundwater that have resulted from a previous leaking unit which no longer exists are not included in the calculations for release reporting.

APPENDIX A

ALPHABETICAL LISTING OF SECTION 313 CHEMICALS

CAS No.	CHEMICAL NAME	De Minimis Conc	Appx VIII	RCRA UTS	RCRA Code
4080-31-3	1-(3-Chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride	1			
354-11-0	1,1,1,2-Tetrachloro-2-fluoroethane (HCFC-121a)	1			
630-20-6	1,1,1,2-tetrachloroethane	1	X	X	U208
71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	1	X	X	U226
354-14-3	1,1,2,2-Tetrachloro-1-fluoroethane (HCFC-121)	1			
79-34-5	1,1,2,2-Tetrachloroethane	1	X	X	U209
79-00-5	1,1,2-Trichloroethane	1	X	X	U227
13474-88-9	1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)	1			
812-04-4	1,1-Dichloro-1,2,2-trifluoroethane (HCFC-123b)	1			
111512-56-2	1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225eb)	1			
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	1			
57-14-7	1,1-Dimethyl hydrazine	0.1	X		U098
5124-30-1	1,1-Methylene bis(4-isocyanatocyclohexane)	1			
96-18-4	1,2,3-Trichloropropane	0.1	X	X	
120-82-1	1,2,4-Trichlorobenzene	1	X	X	
95-63-6	1,2,4-Trimethylbenzene	1			
106-88-7	1,2-Butylene oxide	1			
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	0.1	X	X	U066
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.1	X	X	U067
422-44-6	1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb)	1			
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (HCFC-123a)	1			
431-86-7	1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)	1			
1649-08-7	1,2-Dichloro-1,1-difluoroethane (HCFC-132b)	1			
95-50-1	1,2-Dichlorobenzene	1	X	X	U070
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	0.1	X	X	U077
540-59-0	1,2-Dichloroethylene	1			
78-87-5	1,2-Dichloropropane	1	X	X	U083
122-66-7	1,2-Diphenylhydrazine (Hydrazobenzene)	0.1	X	X	U109
95-54-5	1,2-Phenylenediamine	1		X	
615-28-1	1,2-Phenylenediamine dihydrochloride	1			
38661-72-2	1,3-Bis(methylisocyanate)cyclohexane	1			
106-99-0	1,3-Butadiene	0.1			
507-55-1	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	1			
136013-79-1	1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea)	1			
541-73-1	1,3-Dichlorobenzene	1	X	X	U071
542-75-6	1,3-Dichloropropylene	0.1	X		U084
123-61-5	1,3-Phenylene diisocyanate				
108-45-2	1,3-Phenylenediamine	1			
10347-54-3	1,4-Bis(methylisocyanate)cyclohexane	1			
2556-36-7	1,4-Cyclohexane diisocyanate	1			
764-41-0	1,4-Dichloro-2-butene	1	X		U074
106-46-7	1,4-Dichlorobenzene	0.1	X	X	U072
123-91-1	1,4-Dioxane	0.1	X	X	U108
104-49-4	1,4-Phenylene diisocyanate				
624-18-0	1,4-Phenylenediamine dihydrochloride	1			
3173-72-6	1,5-Naphthalene diisocyanate	1			
82-28-0	1-Amino-2-methylanthraquinone	0.1			
35691-65-7	1-Bromo-1-(bromomethyl)-1,3-propanedicarbonitrile	1			
354-25-6	1-Chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	1			

75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	1			
5522-43-0	1-Nitropyrene	1			
16938-22-0	2,2,4-Trimethylhexamethylene diisocyanate	1			
128903-21-9	2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)	1			
306-83-2	2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)	1			
2655-15-4	2,3,5-Trimethylphenyl methylcarbamate	1			
422-48-0	2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)	1			
78-88-6	2,3-Dichloropropene	1			
15646-96-5	2,4,4-Trimethylhexamethylene diisocyanate	1			
95-95-4	2,4,5-Trichlorophenol	1	X	X	
88-06-2	2,4,6-Trichlorophenol	0.1	X	X	
94-75-7	2,4-D [Acetic acid, (2,4-dichloro-phenoxy)-]	1	X	X	U240
53404-37-8	2,4-D 2-ethyl-4-methylpentyl ester	0.1			
1928-43-4	2,4-D 2-ethylhexyl ester	0.1			
1929-73-3	2,4-D butoxyethyl ester	0.1			
94-80-4	2,4-D butyl ester	0.1			
2971-38-2	2,4-D chlorocrotyl ester	0.1			
94-11-1	2,4-D isopropyl ester	0.1			
1320-18-9	2,4-D propylene glycol butyl ether ester	0.1			
2702-72-9	2,4-D sodium salt	0.1			
94-82-6	2,4-DB	1			
615-05-4	2,4-Diaminoanisole	0.1			
39156-41-7	2,4-Diaminoanisole sulfate	0.1			
95-80-7	2,4-Diaminotoluene	0.1	X		
120-83-2	2,4-Dichlorophenol	1	X	X	U081
75790-87-3	2,4'-Diisocyanatodiphenyl sulfide	1			
105-67-9	2,4-Dimethylphenol	1	X	X	U101
51-28-5	2,4-Dinitrophenol	1	X	X	P048
121-14-2	2,4-Dinitrotoluene	1	X	X	U105
541-53-7	2,4-Dithiobiuret	1	X		P049
120-36-5	2,4-DP	0.1			
576-26-1	2,6-Dimethylphenol	1			
606-20-2	2,6-Dinitrotoluene	1	X	X	U106
87-62-7	2,6-Xylidine	0.1			
53-96-3	2-Acetylaminofluorene	0.1	X	X	U005
117-79-3	2-Aminoanthraquinone	0.1			
52-51-7	2-Bromo-2-nitropropane-1,3-diol (Bronopol)	1			
2837-89-0	2-Chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	0.1			
75-88-7	2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	1			
532-27-4	2-Chloroacetophenone	1			
110-80-5	2-Ethoxyethanol	1	X		U359
149-30-4	2-Mercaptobenzothiazole (MBT)	1			
109-86-4	2-Methoxyethanol	1			
75-86-5	2-Methyllactonitrile	1	X		P069
109-06-8	2-Methylpyridine	1	X		U191
88-75-5	2-Nitrophenol	1		X	
79-46-9	2-Nitropropane	0.1	X		U171
90-43-7	2-Phenylphenol	1			
422-56-0	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	1			
91-94-1	3,3'-Dichlorobenzidine	0.1	X		U073
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	0.1			
64969-34-2	3,3'-Dichlorobenzidine sulfate	0.1			
119-90-4	3,3'-Dimethoxybenzidine	0.1	X		U091

91-93-0	3,3'-Dimethoxybenzidine-4,4'-diisocyanate				
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride (o-Dianisidine dihydrochloride)	0.1			
111984-09-9	3,3'-Dimethoxybenzidine hydrochloride (o-Dianisidine hydrochloride)	0.1			
91-97-4	3,3'-Dimethyl-4,4'-diphenylene diisocyanate				
119-93-7	3,3'-Dimethylbenzidine (o-Tolidine)	0.1	X		U095
612-82-8	3,3'-Dimethylbenzidine dihydrochloride (o-Tolidine dihydrochloride)	0.1			
41766-75-0	3,3'-Dimethylbenzidine dihydrofluoride (o-Tolidine dihydrofluoride)	0.1			
460-35-5	3-Chloro-1,1,1-trifluoropropane (HCFC-253fb)	1			
563-47-3	3-Chloro-2-methyl-1-propene	0.1			
542-76-7	3-Chloropropionitrile	1	X		P027
55406-53-6	3-Iodo-2-propynyl butylcarbamate	1	X	X	
101-80-4	4,4'-Diaminodiphenyl ether	0.1			
4128-73-8	4,4'-Diisocyanatodiphenyl ether	1			
80-05-7	4,4'-Isopropylidenediphenol	1			
101-14-4	4,4'-Methylenebis(2-chloroaniline) (MBOCA)	0.1	X	X	U158
101-61-1	4,4'-Methylenebis(N,N-dimethyl)benzenamine	0.1			
101-77-9	4,4'-Methylenedianiline	0.1			
139-65-1	4,4'-Thiodianiline	0.1			
534-52-1	4,6-Dinitro-o-cresol	1	X	X	P047
60-09-3	4-Aminoazobenzene	0.1			
92-67-1	4-Aminobiphenyl	0.1	X	X	
60-11-7	4-Dimethylaminoazobenzene	0.1	X	X	U093
75790-84-0	4-Methyldiphenylmethane-3,4-diisocyanate	1			
92-93-3	4-Nitrobiphenyl	0.1			
100-02-7	4-Nitrophenol	1	X	X	U170
3697-24-3	5-Methylchrysene				
99-59-2	5-Nitro-o-anisidine	1			
99-55-8	5-Nitro-o-toluidine	1	X	X	U181
57-97-6	7,12-Dimethylbenz(a)anthracene				U094
194-59-2	7H-Dibenzo(c,g)carbazole				
71751-41-2	Abamectin [Avermectin B1]	1			
30560-19-1	Acephate (Acetylphosphoramidothioic acid O,S-dimethyl ester)	1			
75-07-0	Acetaldehyde	0.1			U001
60-35-5	Acetamide	0.1			
75-05-8	Acetonitrile	1	X	X	U003
98-86-2	Acetophenone	1	X		U004
62476-59-9	Acifluorfen, sodium salt [5-(2-Chloro-4-(trifluoromethyl)phenoxy)-2-nitrobenzoic acid, sodium salt]	1			
107-02-8	Acrolein	1	X	X	P003
79-06-1	Acrylamide	0.1	X	X	U007
79-10-7	Acrylic acid	1			U008
107-13-1	Acrylonitrile	0.1	X	X	U009
15972-60-8	Alachlor	1			
116-06-3	Aldicarb	1	X		P070
309-00-2	Aldrin [1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1.alpha.,4.alpha.,4a.beta.,5.alpha.,8.alpha.,8a.beta.)-]	1	X		P004
107-18-6	Allyl alcohol	1	X		P005

107-05-1	Allyl chloride	1	X	X	
107-11-9	Allylamine	1			
319-84-6	alpha-Hexachlorocyclohexane	1		X	
134-32-7	alpha-Naphthylamine	0.1	X		U167
7429-90-5	Aluminum (fume or dust)	1			
1344-28-1	Aluminum oxide (fibrous form)	1			
20859-73-8	Aluminum phosphide	1	X		P006
834-12-8	Ametryn (N-Ethyl-N'-(1-methylethyl)-6-(methylthio)-1,3,5,-triazine-2,4-diamine)	1			
33089-61-1	Amitraz	1			
61-82-5	Amitrole	0.1	X		U011
7664-41-7	Ammonia	1			
101-05-3	Anilazine [4,6-Dichloro-N-(2-chlorophenyl)-1,3,5-triazin-2-amine]	1			
62-53-3	Aniline	1	X	X	U012
120-12-7	Anthracene	1		X	
7440-36-0	Antimony	1	X	X	
7440-38-2	Arsenic	0.1	X	X	
1332-21-4	Asbestos (friable)	0.1			
1912-24-9	Atrazine (6-Chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine)	0.1			
7440-39-3	Barium	1	X	X	
22781-23-3	Bendiocarb [2,2-Dimethyl-1,3-benzodioxol-4-ol methylcarbamate]	1	X	X	
1861-40-1	Benfluralin (N-Butyl-N-ethyl-2,6-dinitro-4-(trifluoromethyl) benzenamine)	1			
17804-35-2	Benomyl	1	X	X	
56-55-3	Benz(a)anthracene				U018
98-87-3	Benzal chloride	1	X	X	U017
55-21-0	Benzamide	1			
71-43-2	Benzene	0.1	X	X	U019
92-87-5	Benzidine	0.1	X		U021
218-01-9	Benzo(a)phenanthrene				
50-32-8	Benzo(a)pyrene				U022
205-99-2	Benzo(b)fluoranthene				
205-82-3	Benzo(j)fluoranthene				
207-08-9	Benzo(k)fluoranthene				
189-55-9	Benzo(rst)pentaphene				U064
98-07-7	Benzoic trichloride (Benzotrichloride)		X		U023
98-88-4	Benzoyl chloride	1			
94-36-0	Benzoyl peroxide	1			
100-44-7	Benzyl chloride	1	X		P028
7440-41-7	Beryllium	0.1	X	X	P015
91-59-8	beta-Naphthylamine	0.1	X	X	U168
57-57-8	beta-Propiolactone	0.1			
82657-04-3	Bifenthrin	1			
92-52-4	Biphenyl	1			
108-60-1	Bis(2-chloro-1-methylethyl)ether	1	X		U027
111-91-1	Bis(2-chloroethoxy) methane	1	X	X	U024
111-44-4	Bis(2-chloroethyl) ether	1	X	X	U025
103-23-1	Bis(2-ethylhexyl) adipate				
542-88-1	Bis(chloromethyl) ether	0.1	X		P016
56-35-9	Bis(tributyltin) oxide	1			

10294-34-5	Boron trichloride	1			
7637-07-2	Boron trifluoride	1			
314-40-9	Bromacil (5-Bromo-6-methyl-3-(1-methylpropyl)-2,4-(1H,3H)-pyrimidinedione)	1			
53404-19-6	Bromacil, lithium salt (2,4-(1H,3H)-Pyrimidinedione, 5-bromo-6-methyl-3 (1'-methylpropyl), lithium salt)	1			
7726-95-6	Bromine	1			
353-59-3	Bromochlorodifluoromethane (Halon 1211)	1			
75-25-2	Bromoform (Tribromomethane)	1	X	X	U225
74-83-9	Bromomethane (Methyl bromide)	1	X	X	U029
75-63-8	Bromotrifluoromethane (Halon 1301)	1			
1689-84-5	Bromoxynil (3,5-Dibromo-4-hydroxybenzonitrile)	1			
1689-99-2	Bromoxynil octanoate (Octanoic acid, 2,6-dibromo-4-cyanophenyl ester)	1			
357-57-3	Brucine	1	X		P018
141-32-2	Butyl acrylate	1			
123-72-8	Butyraldehyde	1			
4680-78-8	C.I. Acid Green 3	1			
6459-94-5	C.I. Acid Red 114	0.1			
569-64-2	C.I. Basic Green 4	1			
989-38-8	C.I. Basic Red 1	1			
1937-37-7	C.I. Direct Black 38	0.1			
28407-37-6	C.I. Direct Blue 218	0.1			
2602-46-2	C.I. Direct Blue 6	0.1			
16071-86-6	C.I. Direct Brown 95	0.1			
2832-40-8	C.I. Disperse Yellow 3	1			
81-88-9	C.I. Food Red 15	1			
3761-53-3	C.I. Food Red 5	0.1			
3118-97-6	C.I. Solvent Orange 7	1			
842-07-9	C.I. Solvent Yellow 14	1			
97-56-3	C.I. Solvent Yellow 3	1			
492-80-8	C.I. Solvent Yellow 34 (Auramine)	0.1	X		U014
128-66-5	C.I. Vat Yellow 4	1			
7440-43-9	Cadmium	0.1	X	X	
156-62-7	Calcium cyanamide	1			
133-06-2	Captan [1H-Isoindole-1,3(2H)-dione, 3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-]	1			
63-25-2	Carbaryl [1-Naphthalenol, methylcarbamate]	1	X	X	
1563-66-2	Carbofuran	1	X	X	
75-15-0	Carbon disulfide	1	X	X	P022
56-23-5	Carbon tetrachloride	0.1	X	X	U211
463-58-1	Carbonyl sulfide	1			
5234-68-4	Carboxin (5,6-Dihydro-2-methyl-N-phenyl-1,4-oxathiin-3-carboxamide)	1			
120-80-9	Catechol	1			
2439-01-2	Chinomethionat (6-Methyl-1,3-dithiolo[4,5-b]quinoxalin-2-one)	1			
133-90-4	Chloramben [Benzoic acid, 3-amino-2,5-dichloro-]	1			
57-74-9	Chlordane [4,7-Methanoindan, 1,2,3,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-]	0.1	X	X	U036
115-28-6	Chlorendic acid	0.1			
90982-32-4	Chlorimuron ethyl (Ethyl-2-[[[(4-chloro-6-methoxyprimidin-2-yl)-carbonyl]-amino]sulfonyl]benzoate)	1			

7782-50-5	Chlorine	1			
10049-04-4	Chlorine dioxide	1			
79-11-8	Chloroacetic acid	1			
108-90-7	Chlorobenzene	1	X	X	U037
510-15-6	Chlorobenzilate [Benzeneacetic acid,4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-hydroxy-, ethyl ester]	1	X	X	
75-45-6	Chlorodifluoromethane (HCFC-22)	1			
75-00-3	Chloroethane (Ethyl chloride)	1		X	
67-66-3	Chloroform	0.1	X	X	U044
74-87-3	Chloromethane (Methyl chloride)	1	X	X	U045
107-30-2	Chloromethyl methyl ether	0.1	X		U046
76-06-2	Chloropicrin	1			
126-99-8	Chloroprene	1	X	X	U210
63938-10-3	Chlorotetrafluoroethane	1			
1897-45-6	Chlorothalonil [1,3-Benzenedicarbonitrile, 2,4,5,6-tetra chloro-]	1			
75-72-9	Chlorotrifluoromethane (CFC-13)	1			
5598-13-0	Chlorpyrifos methyl (O,O-Dimethyl-O-(3,5,6-trichloro-2-pyridyl)phosphorothioate)	1			
64902-72-3	Chlorsulfuron (2-Chloro-N-[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]benzenesulfonamide)	1			
7440-47-3	Chromium	0.1	X	X	
7440-48-4	Cobalt	0.1			
7440-50-8	Copper	1			
8001-58-9	Creosote	0.1			U051
1319-77-3	Cresol (mixed isomers)	1	X		U052
4170-30-3	Crotonaldehyde	1	X		U053
98-82-8	Cumene	1			U055
80-15-9	Cumene hydroperoxide	1			U096
135-20-6	Cupferron [Benzeneamine, N-hydroxy-N-nitroso, ammonium salt]	0.1			
21725-46-2	Cyanazine	1			
1134-23-2	Cycloate	1	X	X	
110-82-7	Cyclohexane	1			U056
108-93-0	Cyclohexanol	1			
68359-37-5	Cyfluthrin (3-(2,2-Dichloroethenyl)-2,2-dimethylcyclopropanecarboxylic acid, cyano(4-fluoro-3-phenoxyphenyl)methyl ester)	1			
68085-85-8	Cyhalothrin (3-(2-Chloro-3,3,3-trifluoro-1-propenyl)-2,2-Dimethylcyclopropanecarboxylic acid cyano(3-phenoxyphenyl) methyl ester)	1			
28057-48-9	d-trans-Allethrin [d-trans-Chrysanthemic acid of d-allethrone]	1			
533-74-4	Dazomet (Tetrahydro-3,5-dimethyl-2H-1,3,5-thiadiazine-2-thione)	1	X		
53404-60-7	Dazomet, sodium salt (Tetrahydro-3,5-dimethyl-2H-1,3,5-thiadiazine-2-thione, ion(1-), sodium)	1			
1163-19-5	Decabromodiphenyl oxide	1			
13684-56-5	Desmedipham	1			
117-81-7	Di(2-ethylhexyl) phthalate (DEHP)	0.1	X	X	U028
2303-16-4	Diallate [Carbamothioic acid, bis(1-methylethyl)-S-(2,3-dichloro-2-propenyl)ester]	1	X		U062
25376-45-8	Diaminotoluene (mixed isomers)	0.1	X		U221
333-41-5	Diazinon	1			

334-88-3	Diazomethane	1			
226-36-8	Dibenz(a,h)acridine				
224-42-0	Dibenz(a,j)acridine				
5385-75-1	Dibenzo(a,e)fluoranthene	1			
192-65-4	Dibenzo(a,e)pyrene				
53-70-3	Dibenzo(a,h)anthracene				U063
189-64-0	Dibenzo(a,h)pyrene				
191-30-0	Dibenzo(a,l)pyrene				
132-64-9	Dibenzofuran	1			
124-73-2	Dibromotetrafluoroethane (Halon 2402)	1			
84-74-2	Dibutyl phthalate	1	X	X	U069
1918-00-9	Dicamba (3,6-Dichloro-2-methyoxybenzoic acid)	1			
99-30-9	Dichloran (2,6-Dichloro-4-nitroaniline)	1			
90454-18-5	Dichloro-1,1,2-trifluoroethane	1			
25321-22-6	Dichlorobenzene (mixed isomers)	0.1	X		
75-27-4	Dichlorobromomethane	1		X	
75-71-8	Dichlorodifluoromethane (CFC-12)	1	X	X	U075
75-43-4	Dichlorofluoromethane (HCFC-21)	1			
75-09-2	Dichloromethane (Methylene chloride)	0.1	X	X	U080
127564-92-5	Dichloropentafluoropropane	1			
97-23-4	Dichlorophene (2,2'-Methylenebis(4-chlorophenol)	1			
76-14-2	Dichlorotetrafluoroethane (CFC-114)	1			
34077-87-7	Dichlorotrifluoroethane	1			
62-73-7	Dichlorvos [Phosphoric acid, 2-dichloroethenyl dimethyl ester]	0.1			
51338-27-3	Diclofop methyl (2-[4-(2,4-Dichlorophenoxy) phenoxy]propanoic acid, methyl ester)	1			
115-32-2	Dicofol [Benzenemethanol, 4-chloro-.alpha.-4-chlorophenyl)-.alpha.-(trichloromethyl)-]	1			
77-73-6	Dicyclopentadiene	1			
1464-53-5	Diepoxybutane	0.1	X		U085
111-42-2	Diethanolamine	1			
38727-55-8	Diethatyl ethyl	1			
84-66-2	Diethyl phthalate	0.1			U088
64-67-5	Diethyl sulfate	0.1			
134190-37-7	Diethyldiisocyanatobenzene				
35367-38-5	Diflubenzuron	1			
101-90-6	Diglycidyl resorcinol ether	0.1			
94-58-6	Dihydrosafrole	0.1	X		U090
55290-64-7	Dimethipin (2,3,-Dihydro-5,6-dimethyl-1,4-dithiin 1,1,4,4-tetraoxide)	1			
60-51-5	Dimethoate	1	X		P044
2524-03-0	Dimethyl chlorothiophosphate	1			
131-11-3	Dimethyl phthalate	1	X	X	U102
77-78-1	Dimethyl sulfate	0.1	X		U103
124-40-3	Dimethylamine	1			U092
2300-66-5	Dimethylamine dicamba	1			
79-44-7	Dimethylcarbamyl chloride	0.1	X		U097
88-85-7	Dinitrobutyl phenol (Dinoseb)	1			P020
25321-14-6	Dinitrotoluene (mixed isomers)	1			
39300-45-3	Dinocap	1			
957-51-7	Diphenamid	1			
122-39-4	Diphenylamine	1	X		

2164-07-0	Dipotassium endothall (7-Oxabicyclo(2.2.1)heptane-2,3-dicarboxylic acid, dipotassium salt)	1			
136-45-8	Dipropyl isocinchomeronate	1			
138-93-2	Disodium cyanodithioimidocarbonate	1			
330-54-1	Diuron	1			
2439-10-3	Dodine (Dodecylguanidine monoacetate)	1			
106-89-8	Epichlorohydrin	0.1	X		U041
13194-48-4	Ethoprop (Phosphorodithioic acid O-ethyl S,S-dipropyl ester)	1			
140-88-5	Ethyl acrylate	0.1			U113
541-41-3	Ethyl chloroformate	1			
759-94-4	Ethyl dipropylthiocarbamate (EPTC)	1	X	X	
100-41-4	Ethylbenzene	1		X	
74-85-1	Ethylene	1			
107-21-1	Ethylene glycol	1			
75-21-8	Ethylene oxide	0.1	X	X	U115
96-45-7	Ethylene thiourea	0.1	X		U116
151-56-4	Ethyleneimine (Aziridine)	0.1	X		P054
75-34-3	Ethylidene dichloride	1	X	X	U076
52-85-7	Famphur	1	X	X	P097
60168-88-9	Fenarimol (.alpha.-(2-Chlorophenyl)-.alpha.-4-chlorophenyl)-5-pyrimidinemethanol)	1			
13356-08-6	Fenbutatin oxide (Hexakis(2-methyl-2-phenylpropyl)distannoxane)	1			
66441-23-4	Fenoxaprop ethyl (2-(4-((6-Chloro-2-benzoxazolylen)oxy)phenoxy)propanoic acid, ethyl ester)	1			
72490-01-8	Fenoxycarb (2-(4-Phenoxy-phenoxy)-ethyl]carbamic acid ethyl ester)	1			
39515-41-8	Fenpropathrin (2,2,3,3-Tetramethylcyclopropane carboxylic acid cyano(3-phenoxyphenyl)methyl ester)	1			
55-38-9	Fenthion (O,O-Dimethyl O-[3-methyl-4-(methylthio) phenyl] ester, phosphorothioic acid)	1			
51630-58-1	Fenvalerate (4-Chloro-alpha-(1-methylethyl)benzeneacetic acid cyano(3-phenoxyphenyl)methyl ester)	1			
14484-64-1	Ferbam (Tris(dimethylcarbamodithioato-S,S')iron)	1	X		
69806-50-4	Fluazifop butyl (2-[4-[[5-(Trifluoromethyl)-2-pyridinyl]oxy]-phenoxy]propanoic acid, butyl ester)	1			
2164-17-2	Fluometuron [Urea, N,N-dimethyl-N'-[3-(trifluoromethyl)phenyl]-]	1			
7782-41-4	Fluorine	1	X		P056
51-21-8	Fluorouracil (5-Fluorouracil)	1			
69409-94-5	Fluvalinate (N-[2-Chloro-4-(trifluoromethyl)phenyl]-DL-valine(+)-cyano(3-phenoxyphenyl)methyl ester)	1			
133-07-3	Folpet	1			
72178-02-0	Fomesafen (5-(2-Chloro-4-(trifluoromethyl)phenoxy)-N methylsulfonyl)-2-nitrobenzamide)	1			
50-00-0	Formaldehyde	0.1	X		U122
64-18-6	Formic acid	1	X		U123
76-13-1	Freon 113 [Ethane, 1,1,2-trichloro-1,2,2,-trifluoro-]	1		X	
76-44-8	Heptachlor [1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene]		X	X	P059
87-68-3	Hexachloro-1,3-butadiene	1	X	X	U128
118-74-1	Hexachlorobenzene	0.1	X	X	U127
77-47-4	Hexachlorocyclopentadiene	1	X	X	U130

67-72-1	Hexachloroethane	1	X	X	U131
1335-87-1	Hexachloronaphthalene	1			
70-30-4	Hexachlorophene	1	X		U132
680-31-9	Hexamethylphosphoramide	0.1			
51235-04-2	Hexazinone	1			
67485-29-4	Hydramethylnon (Tetrahydro-5,5-dimethyl-2(1H)-pyrimidinone[3-[4-(trifluoromethyl)phenyl]-1-[2-[4-(trifluoromethyl)phenyl]ethenyl]-2-propenylidene]hydrazone)	1			
302-01-2	Hydrazine	0.1	X		U133
10034-93-2	Hydrazine sulfate	0.1			
7647-01-0	Hydrochloric acid	1			
74-90-8	Hydrogen cyanide	1	X		P063
7664-39-3	Hydrogen fluoride	1	X		U134
123-31-9	Hydroquinone	1			
35554-44-0	Imazalil (1-[2-(2,4-Dichlorophenyl)-2-(2-propenyloxy)ethyl]-1H-imidazole)	1			
193-39-5	Indeno[1,2,3-cd]pyrene				U137
13463-40-6	Iron pentacarbonyl	1			
78-84-2	Isobutyraldehyde	1			
465-73-6	Isodrin	1	X	X	P060
25311-71-1	Isofenphos (2-[[Ethoxyl[(1-methylethyl)amino] phosphinothioyl]oxy] benzoic acid 1-methylethyl ester)	1			
4098-71-9	Isophorone diisocyanate	1			
67-63-0	Isopropyl alcohol (mfg-strong acid process)	1			
120-58-1	Isosafrole	1	X	X	U141
77501-63-4	Lactofen (5-(2-Chloro-4-(trifluoromethyl)phenoxy)-2-nitro-2-ethoxy-1-methyl-2-oxoethyl ester)	1			
7439-92-1	Lead	0.1	X	X	
58-89-9	Lindane [Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1.alpha.,2.alpha.,3.beta.,4.alpha.,5.alpha.,6.beta.)-]	0.1	X	X	U129
330-55-2	Linuron	1			
554-13-2	Lithium carbonate	1			
108-39-4	m-Cresol	1		X*	U052
99-65-0	m-Dinitrobenzene	1			
108-38-3	m-Xylene	1		X*	U239
121-75-5	Malathion	1			
108-31-6	Maleic anhydride	1	X		U147
109-77-3	Malononitrile	1	X		U149
12427-38-2	Maneb [Carbamodithioic acid, 1,2-ethanediylbis-, manganese complex]	1			
7439-96-5	Manganese	1			
93-65-2	Mecoprop	0.1			
7439-97-6	Mercury	1	X	X	U151
150-50-5	Merphos	1			
126-98-7	Methacrylonitrile	1	X	X	
137-42-8	Metham sodium (Sodium methyldithiocarbamate)	1	X		
67-56-1	Methanol	1		X	U154
20354-26-1	Methazole (2-(3,4-Dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione)	1			
2032-65-7	Methiocarb	1	X	X	
94-74-6	Methoxone ((4-Chloro-2-methylphenoxy) acetic acid) (MCPA)	0.1			

3653-48-3	Methoxone sodium salt ((4-Chloro-2-methylphenoxy) acetate sodium salt)	0.1			
72-43-5	Methoxychlor [Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-methoxy-]	1	X	X	U247
96-33-3	Methyl acrylate	1			
79-22-1	Methyl chlorocarbonate	1	X		U156
78-93-3	Methyl ethyl ketone	1	X	X	U159
60-34-4	Methyl hydrazine	1	X		P068
74-88-4	Methyl iodide	1	X	X	U138
108-10-1	Methyl isobutyl ketone	1		X	U161
624-83-9	Methyl isocyanate	1	X		P064
556-61-6	Methyl isothiocyanate (Isothiocyanatomethane)	1			
80-62-6	Methyl methacrylate	1	X	X	U162
298-00-0	Methyl parathion	1	X	X	P071
1634-04-4	Methyl tert-butyl ether	1			
74-95-3	Methylene bromide	1	X	X	U068
101-68-8	Methylenebis(phenylisocyanate) (MBI)				
101-68-8	Methylenebis(phenylisocyanate) (MDI)				
9006-42-2	Metiram	1			
21087-64-5	Metribuzin	1			
7786-34-7	Mevinphos	1			
90-94-8	Michler's ketone	0.1			
2212-67-1	Molinate (1H-Azepine-1 carbothioic acid, hexahydro-S-ethyl ester)	1	X	X	
1313-27-5	Molybdenum trioxide	1			
76-15-3	Monochloropentafluoroethane (CFC-115)	1			
150-68-5	Monuron	1			
505-60-2	Mustard gas [Ethane, 1,1'-thiobis[2-chloro-]	0.1	X		
88671-89-0	Myclobutanil (.alpha.-Butyl-.alpha.-(4-chlorophenyl)-1H-1,2,4-triazole-1-propanenitrile)	1			
121-69-7	N,N-Dimethylaniline	1			
68-12-2	N,N-Dimethylformamide	0.1			
71-36-3	n-Butyl alcohol	1		X	U031
110-54-3	n-Hexane	1			
872-50-4	N-Methyl-2-pyrrolidone	1			
924-42-5	N-Methylolacrylamide	1			
759-73-9	N-Nitroso-N-ethylurea	0.1	X		U176
684-93-5	N-Nitroso-N-methylurea	0.1	X		U177
924-16-3	N-Nitrosodi-n-butylamine	0.1	X	X	U172
621-64-7	N-Nitrosodi-n-propylamine	0.1	X	X	U111
55-18-5	N-Nitrosodiethylamine	0.1	X	X	U174
62-75-9	N-Nitrosodimethylamine	0.1	X		P082
86-30-6	N-Nitrosodiphenylamine	1		X	
4549-40-0	N-Nitrosomethylvinylamine	0.1	X		P084
59-89-2	N-Nitrosomorpholine	0.1	X	X	
16543-55-8	N-Nitrosonornicotine	0.1	X		
100-75-4	N-Nitrosopiperidine	0.1	X	X	U179
142-59-6	Nabam	1			
300-76-5	Naled	1			
91-20-3	Naphthalene	1	X	X	U165
7440-02-0	Nickel	0.1	X	X	
1929-82-4	Nitrapyrin (2-Chloro-6-(trichloromethyl)pyridine)	1			
7697-37-2	Nitric acid	1			

139-13-9	Nitrilotriacetic acid	0.1			
98-95-3	Nitrobenzene	1	X	X	U169
1836-75-5	Nitrofen [Benzene, 2,4-dichloro-1-(4-nitrophenoxy)-]	0.1			
51-75-2	Nitrogen mustard [2-Chloro-N-(2-chloroethyl)-N-methylethanamine]	0.1	X		
55-63-0	Nitroglycerin	1	X		P081
27314-13-2	Norflurazon (4-Chloro-5-(methylamino)-2-[3-(trifluoromethyl)phenyl]-3(2H)-pyridazinone)	1			
90-04-0	o-Anisidine	0.1			
134-29-2	o-Anisidine hydrochloride	0.1			
95-48-7	o-Cresol	1		X	U052
528-29-0	o-Dinitrobenzene	1			
95-53-4	o-Toluidine	0.1	X		U328
636-21-5	o-Toluidine hydrochloride	0.1	X		U222
95-47-6	o-Xylene	1		X	U239
2234-13-1	Octachloronaphthalene	1			
19044-88-3	Oryzalin (4-(Dipropylamino)-3,5-dinitrobenzenesulfonamide)	1			
20816-12-0	Osmium tetroxide	1	X		P087
301-12-2	Oxydemeton methyl (S-(2-(Ethylsulfinyl)ethyl) O,O-dimethyl ester phosphorothioic acid)	1			
19666-30-9	Oxydiazon (3-[2,4-Dichloro-5-(1-methylethoxy)phenyl]-5-(1,1-dimethylethyl)-1,3,4-oxadiazol-2(3H)-one)	1			
42874-03-3	Oxyfluorfen	1			
10028-15-6	Ozone	1			
104-94-9	p-Anisidine	1			
95-69-2	p-Chloro-o-toluidine	0.1			
106-47-8	p-Chloroaniline	0.1	X	X	P024
104-12-1	p-Chlorophenyl isocyanate	1			
120-71-8	p-Cresidine	0.1			
106-44-5	p-Cresol	1		X*	U239
100-25-4	p-Dinitrobenzene	1		X	
100-01-6	p-Nitroaniline	1	X	X	P077
156-10-5	p-Nitrosodiphenylamine	1			
106-50-3	p-Phenylenediamine	1			
106-42-3	p-Xylene	1		X*	U239
123-63-7	Paraldehyde	1	X		U182
1910-42-5	Paraquat dichloride	1			
56-38-2	Parathion [Phosphorothioic acid, O,O-diethyl-O-(4-nitrophenyl) ester]	1	X	X	P089
1114-71-2	Pebulate (Butylethylcarbamothioic acid S-propyl ester)	1	X	X	
40487-42-1	Pendimethalin (N-(1-Ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine)	1			
76-01-7	Pentachloroethane	1	X	X	U184
87-86-5	Pentachlorophenol (PCP)	0.1	X	X	
57-33-0	Pentobarbital sodium	1			
79-21-0	Peracetic acid	1			
594-42-3	Perchloromethyl mercaptan	1			
52645-53-1	Permethrin (3-(2,2-Dichloroethenyl)-2,2-dimethylcyclopropane carboxylic acid, (3-phenoxyphenyl)methyl ester)	1			
85-01-8	Phenanthrene	1		X	
108-95-2	Phenol	1	X		U188

26002-80-2	Phenothrin (2,2-Dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylic acid (3-phenoxyphenyl)methyl ester)	1			
57-41-0	Phenytoin	0.1			
75-44-5	Phosgene	1	X		P095
7803-51-2	Phosphine	1	X		P096
7664-38-2	Phosphoric acid	1			
7723-14-0	Phosphorus (yellow or white)	1			
85-44-9	Phthalic anhydride	1	X	X	U190
1918-02-1	Picloram	1			
88-89-1	Picric acid	1			
51-03-6	Piperonyl butoxide	1			
29232-93-7	Pirimiphos methyl (O-(2-(Diethylamino)-6-methyl-4-pyrimidinyl)-O,O-dimethyl phosphorothioate)	1			
1336-36-3	Polychlorinated biphenyls (PCBs)	0.1		X	
9016-87-9	Polymeric diphenylmethane diisocyanate	1			
7758-01-2	Potassium bromate	0.1			
128-03-0	Potassium dimethyldithiocarbamate	1	X		
137-41-7	Potassium N-methyldithiocarbamate	1	X		
41198-08-7	Profenofos (O-(4-Bromo-2-chlorophenyl)-O-ethyl-S-propylphosphorothioate)	1			
7287-19-6	Prometryn (N,N'-Bis(1-methylethyl)-6-methylthio-1,3,5-triazine-2,4-diamine)	1			
23950-58-5	Pronamide	1	X	X	U192
1918-16-7	Propachlor (2-Chloro-N-(1-methylethyl)-N-phenylacetamide)	1			
1120-71-4	Propane sultone	0.1	X		U193
709-98-8	Propanil (N-(3,4-Dichlorophenyl)propanamide)	1			
2312-35-8	Propargite	1			
107-19-7	Propargyl alcohol	1	X		P102
31218-83-4	Propetamphos (3-[(Ethylamino)methoxyphosphinothioyl]oxy]-2-butenoic acid, 1-methylethyl ester)	1			
60207-90-1	Propiconazole (1-[2-(2,4-Dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]-methyl-1H-1,2,4,-triazole)	1			
123-38-6	Propionaldehyde	1			
114-26-1	Propoxur [Phenol, 2-(1-methylethoxy)-, methylcarbamate]	1	X	X	
115-07-1	Propylene (Propene)	1			
75-56-9	Propylene oxide	0.1			
75-55-8	Propyleneimine	0.1	X		P067
110-86-1	Pyridine	1	X	X	U196
91-22-5	Quinoline	1			
106-51-4	Quinone	1	X		U197
82-68-8	Quintozene (Pentachloronitrobenzene)	1	X	X	U185
76578-14-8	Quizalofop-ethyl (2-[4-[(6-Chloro-2-quinoxalinyl)oxy]phenoxy] propanoic acid ethyl ester)	1			
10453-86-8	Resmethrin ([5-(Phenylmethyl)-3-furanyl]methyl 2,2-dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylate])	1			
78-48-8	S,S,S-Tributyltrithiophosphate (DEF)	1			
81-07-2	Saccharin (manufacturing)	0.1	X		U202
94-59-7	Safrole	0.1	X	X	U203
78-92-2	sec-Butyl alcohol	1			
7782-49-2	Selenium	1	X	X	

74051-80-2	Sethoxydim (2-[1-(Ethoxyimino) butyl]-5-[2-(ethylthio)propyl]-3-hydroxyl-2-cyclohexen-1-one)	1			
7440-22-4	Silver	1	X	X	
122-34-9	Simazine	1			
26628-22-8	Sodium azide	1			P105
1982-69-0	Sodium dicamba (3,6-Dichloro-2-methoxybenzoic acid, sodium salt)	1			
128-04-1	Sodium dimethyldithiocarbamate	1	X		
62-74-8	Sodium fluoroacetate	1	X		P058
7632-00-0	Sodium nitrite	1			
132-27-4	Sodium o-phenylphenoxide	0.1			
131-52-2	Sodium pentachlorophenate	1			
100-42-5	Styrene	0.1			
96-09-3	Styrene oxide	0.1			
7664-93-9	Sulfuric acid	1			
2699-79-8	Sulfuryl fluoride (Vikane)	1			
35400-43-2	Sulprofos (O-Ethyl O-[4-(methylthio)phenyl]phosphorodithioic acid S-propyl ester)	1			
34014-18-1	Tebuthiuron (N-[5-(1,1-Dimethylethyl)-1,3,4-thiadiazol-2-yl)-N,N'-dimethylurea)	1			
3383-96-8	Temephos	1			
5902-51-2	Terbacil (5-Chloro-3-(1,1-dimethylethyl)-6-methyl- 2,4 (1H,3H)-pyrimidinedione)	1			
75-65-0	tert-Butyl alcohol	1			
127-18-4	Tetrachloroethylene (Perchloroethylene)	0.1	X	X	
961-11-5	Tetrachlorvinphos [Phosphoric acid, 2-chloro-1-(2,3,5-trichlorophenyl) ethenyl dimethyl ester]	1			
64-75-5	Tetracycline hydrochloride	1			
7696-12-0	Tetramethrin (2,2-Dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylic acid (1,3,4,5,6,7-hexahydro-1,3-dioxo-2H-isoindol-2-yl)methyl ester)	1			
7440-28-0	Thallium	1	X	X	
148-79-8	Thiabendazole (2-(4-Thiazolyl)-1H-benzimidazole)	1			
62-55-5	Thioacetamide	0.1	X		U218
28249-77-6	Thiobencarb (Carbamic acid, diethylthio-, S-(p-chlorobenzyl))	1			
59669-26-0	Thiodicarb	1	X	X	
23564-05-8	Thiophanate-methyl	1	X	X	
23564-06-9	Thiophanate ethyl ([1,2-Phenylenebis (iminocarbonothioyl)] biscarbamic acid diethyl ester)	1			
79-19-6	Thiosemicarbazide	1	X		P116
62-56-6	Thiourea	0.1	X		U219
137-26-8	Thiram	1	X		U244
1314-20-1	Thorium dioxide	1			
7550-45-0	Titanium tetrachloride	1			
108-88-3	Toluene	1	X	X	U220
584-84-9	Toluene-2,4-diisocyanate	0.1			
91-08-7	Toluene-2,6-diisocyanate	0.1			
26471-62-5	Toluene diisocyanate (mixed isomers)	0.1	X		U223
8001-35-2	Toxaphene	0.1	X	X	P123
10061-02-6	trans-1,3-Dichloropropene	0.1		X	
110-57-6	trans-1,4-Dichloro-2-butene	1			
43121-43-3	Triadimefon (1-(4-Chlorophenoxy)-3,3-dimethyl-1-(1H-1,2,4-triazol-1-yl)-2-butanone)	1			

2303-17-5	Triallate	1	X	X	
68-76-8	Triaziquone [2,5-Cyclohexadiene-1,4-dione, 2,3,5-tris(1-aziridinyl)-]	1			
101200-48-0	Tribenuron methyl (2-(4-Methoxy-6-methyl-1,3,5-triazin-2-yl)-methylamino)carbonyl)amino)sulfonyl)-, methyl ester)	1			
1983-10-4	Tributyltin fluoride	1			
2155-70-6	Tributyltin methacrylate	1			
52-68-6	Trichlorfon [Phosphonic acid, (2,2,2-trichloro-1-hydroxyethyl)-,dimethyl ester]	1			
76-02-8	Trichloroacetyl chloride	1			
79-01-6	Trichloroethylene	0.1	X	X	U228
75-69-4	Trichlorofluoromethane (CFC-11)	1	X	X	U121
57213-69-1	Triclopyr triethylammonium salt	1			
121-44-8	Triethylamine	1	X		
1582-09-8	Trifluralin [Benezeneamine, 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)-]	1			
26644-46-2	Triforine (N,N'-[1,4-Piperazinediylbis(2,2,2-trichloroethylidene)] bisformamide)	1			
639-58-7	Triphenyltin chloride	1			
76-87-9	Triphenyltin hydroxide	1			
126-72-7	Tris(2,3-dibromopropyl) phosphate	0.1	X	X	U235
72-57-1	Trypan blue	0.1	X		U236
51-79-6	Urethane (Ethyl carbamate)	0.1	X		U238
7440-62-2	Vanadium (fume or dust)	1		X	
50471-44-8	Vinclozolin (3-(3,5-Dichlorophenyl)-5-ethenyl-5-methyl-2,4-oxazolidinedione)	1			
108-05-4	Vinyl acetate	0.1			
593-60-2	Vinyl bromide	0.1			
75-01-4	Vinyl chloride	0.1	X	X	U043
75-35-4	Vinylidene chloride	1	X	X	U078
1330-20-7	Xylene (mixed isomers)	1		X	U239
7440-66-6	Zinc (fume or dust)	1		X	
12122-67-7	Zineb [Carbamodithioic acid, 1,2-ethanediylbis-, zinc complex]	1			

* as mixed isomers (sum)

Chemical Categories

Section 313 requires reporting on the toxic chemical categories listed below, in addition to the specific toxic chemicals listed above.

The metal compounds listed below, unless otherwise specified, are defined as including any unique chemical substance that contains the named metal (i.e., antimony, nickel, etc.) as part of that chemical's structure.

Toxic chemical categories are subject to the 1 percent *de minimis* concentration unless the substance involved meets the definition of an OSHA carcinogen in which case the 0.1 percent *de minimis* concentration applies. The *de minimis* concentration for each category is provided in parentheses.

Chemical Categories

Antimony Compounds (1.0)

Includes any unique chemical substance that contains antimony as part of that chemical's infrastructure.

Arsenic Compounds (inorganic compounds: 0.1; organic compounds: 1.0)

Includes any unique chemical substance that contains arsenic as part of that chemical's infrastructure.

Barium Compounds (1.0)

Includes any unique chemical substance that contains barium as part of that chemical's infrastructure.

This category does not include: Barium sulfate CAS Number 7727-43-7

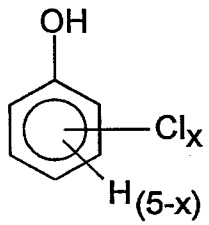
Beryllium Compounds (0.1)

Includes any unique chemical substance that contains beryllium as part of that chemical's infrastructure.

Cadmium Compounds (0.1)

Includes any unique chemical substance that contains cadmium as part of that chemical's infrastructure.

Chlorophenols (0.1)



Where x = 1 to 5

Chromium Compounds (chromium VI compounds: 0.1; chromium III compounds: 1.0)

Includes any unique chemical substance that contains chromium as part of that chemical's infrastructure.

Cobalt Compounds (0.1)

Includes any unique chemical substance that contains cobalt as part of that chemical's infrastructure.

Copper Compounds (1.0)

Includes any unique chemical substance that contains copper as part of that chemical's infrastructure.

This category does not include copper phthalocyanine compounds that are substituted with only hydrogen, and/or chlorine, and/or bromine.

Cyanide Compounds (1.0)

X^+CN^- where $X = H^+$ or any other group where a formal dissociation may occur. For example KCN or $Ca(CN)_2$.

Diisocyanates (1.0)

This category includes only those chemicals listed below.

38661-72-2	1,3-Bis(methylisocyanate)cyclohexane
10347-54-3	1,4-Bis(methylisocyanate)cyclohexane
2556-36-7	1,4-Cyclohexane diisocyanate
134190-37-7	Diethyldiisocyanatobenzene
4128-73-8	4,4'-Diisocyanatodiphenyl ether
75790-87-3	2,4'-Diisocyanatodiphenyl sulfide
91-93-0	3,3'-Dimethoxybenzidine-4,4'-diisocyanate
91-97-4	3,3'-Dimethyl-4,4'-diphenylene diisocyanate
139-25-3	3,3'-Dimethyldiphenylmethane-4,4'-diisocyanate

822-06-0	Hexamethylene-1,6-diisocyanate
4098-71-9	Isophorone diisocyanate
75790-84-0	4-Methyldiphenylmethane-3,4-diisocyanate
5124-30-1	1,1-Methylene bis(4-isocyanatocyclohexane)
101-68-8	Methylenebis(phenylisocyanate) (MDI)
3173-72-6	1,5-Naphthalene diisocyanate
123-61-5	1,3-Phenylene diisocyanate
104-49-4	1,4-Phenylene diisocyanate
9016-87-9	Polymeric diphenylmethane diisocyanate
16938-22-0	2,2,4-Trimethylhexamethylene diisocyanate
15646-96-5	2,4,4-Trimethylhexamethylene diisocyanate

Ethylenebisdithiocarbamic acid, salts and esters (EBDCs) (1.0)

Includes any unique chemical substance that is or that contains EBDC or an EBDC salt or ester as part of that chemical's infrastructure.

Certain Glycol Ethers (1.0)

$R\text{-}(OCH_2CH_2)_n\text{-}OR'$

Where n = 1, 2, or 3

R = alkyl C7 or less; or

R = phenyl or alkyl substituted phenyl;

R' = H, or alkyl C7 or less; or

OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.

Lead Compounds (inorganic compounds: 0.1; organic compounds 1.0)

Includes any unique chemical substance that contains lead as part of that chemical's infrastructure.

Manganese Compounds (1.0)

Includes any unique chemical substance that contains manganese as part of that chemical's infrastructure.

Mercury Compounds (1.0)

Includes any unique chemical substance that contains mercury as part of that chemical's infrastructure.

Nickel Compounds (0.1)

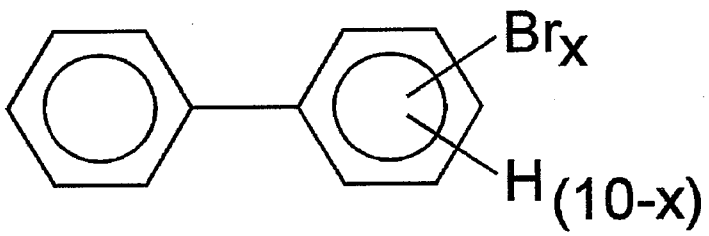
Includes any unique chemical substance that contains nickel as part of that chemical's infrastructure.

Nicotine and salts (1.0)

Includes any unique chemical substance that contains nicotine or a nicotine salt as part of that chemical's infrastructure.

Nitrate compounds (water dissociable; reportable only when in aqueous solution) (1.0)

Polybrominated Biphenyls (PBBs) (0.1)



Where x = 1 to 10

Polychlorinated alkanes (C10 to C13) (1.0, except for those members of the category that have an average chain length of 12 carbons and contain an average chlorine content of 60 percent by weight which are subject to the 0.1 percent *de minimis*)

$C_xH_{2x+2-y}Cl_y$

where x = 10 to 13;

y = 3 to 12; and

the average chlorine content ranges from 40 - 70% with the limiting molecular formulas $C_{10}H_{19}Cl_3$ and $C_{13}H_{16}Cl_{12}$.

Polycyclic aromatic compounds (PACs) (0.1, except for benzo(a)phenanthrene and dibenzo(a,e)fluoranthene which are subject to the 1.0 percent *de minimis*)

This category includes only those chemicals listed below.

56-55-3	Benz(a)anthracene
205-99-2	Benzo(b)fluoranthene
205-82-3	Benzo(j)fluoranthene
207-08-9	Benzo(k)fluoranthene

189-55-9	Benzo(rst)pentaphene
218-01-9	Benzo(a)phenanthrene
50-32-8	Benzo(a)pyrene
226-36-8	Dibenz(a,h)acridine
224-42-0	Dibenz(a,j)acridine
53-70-3	Dibenzo(a,h)anthracene
194-59-2	7H-Dibenzo(c,g)carbazole
5385-75-1	Dibenzo(a,e)fluoranthene
192-65-4	Dibenzo(a,e)pyrene
189-64-0	Dibenzo(a,h)pyrene
191-30-0	Dibenzo(a,l)pyrene
57-97-6	7,12-Dimethylbenz(a)anthracene
193-39-5	Indeno[1,2,3-cd]pyrene
3697-24-3	5-Methylchrysene
5522-43-0	1-Nitropyrene

Selenium Compounds (1.0)

Includes any unique chemical substance that contains selenium part of that chemical's infrastructure.

Silver Compounds (1.0)

Includes any unique chemical substance that contains silver part of that chemical's infrastructure.

Strychnine and salts (1.0)

Includes any unique chemical substance that contains strychnine or a strychnine salt as part of that chemical's infrastructure.

Thallium Compounds (1.0)

Includes any unique chemical substance that contains thallium as part of that chemical's infrastructure.

Warfarin and salts (1.0)

Includes any unique chemical substance that contains warfarin or a warfarin salt as part of that chemical's infrastructure.

Zinc Compounds (1.0)

Includes any unique chemical substance that contains zinc as part of that chemical's infrastructure.

APPENDIX B

BIBLIOGRAPHY

*Kirk-Othmer Encyclopedia of Chemical Technology, 4th Edition.*Volume 12. "Fuel Resources." John Wiley & Sons, Inc. New York, NY. 1994.

Science Applications International Corporation. *SIC Code Profile 50 and 51: Wholesale Trade-Durable and Nondurable Goods.* April,1997.

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates.* EPA-453/R-95-017. November 1995.

Office of Management and Budget, *Standard Industrial Classification Manual,* 1987.

U.S. Bureau of Census. *1992 Industry and Product Classification Manual.*

U.S. Environmental Protection Agency. *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313.* April 1997.

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. *Compilation of Air Pollutant Emission Factors, 5th Edition, Volume I: Stationary Point and Area Sources* (AP-42). EPA 450-AP-425ED. 1995.

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form.* EPA 560/4-88-002. December 1987.

APPENDIX C

SECTION 313 RELATED MATERIALS AND ELECTRONIC ACCESS TO INFORMATION

Ordering information for the following documents, in addition to *Toxic Chemical Release Inventory Reporting Form R and Instructions*, can be obtained by calling the EPCRA Hotline at 1-800-535-0202.

Common Synonyms for Section 313 Chemicals. EPA 745-R-95-008. March 1995.

Compilation of Air Pollutant Emission Factors, 5th Edition, Volume I: Stationary Point and Area Sources **(AP-42).** EPA 450-AP-425ED. 1995.

Consolidated List of Chemicals Subject to Reporting Under the Act (Title III List of Lists). EPA 550-B-96-015.

Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form. EPA 560/4-88-002. December 1987.

Estimating Releases of Mineral Acid Discharges Using pH Measurements. June 1991.

Interpretations of Waste Management Activities: Recycling, Combustion for Energy Recovery, Waste Stabilization and Release. April, 1997.

Protocol for Equipment Leak Emission Estimates. EPA 453/R-95-017. November 1995.

Toxic Chemical Release Inventory Questions and Answers, Revised 1990 Version. EPA 560/4/91-003.

World Wide Web Resources

Code of Federal Regulations, 40 CFR
www.epa.gov/epacfr40

CHEMDAT8/WATER8
www.epa.gov/ttn/chief/software.html#water8

Clearinghouse for Inventories and Emission Factors (CHIEF)
www.epa.gov/ttn/chief/

Compilation of Air Pollutant Emission Factors (AP-42)
www.epa.gov/ttn/chief/ap42etc.html

EPA homepage
www.epa.gov

Federal Registers
www.epa.gov/EPA-TRI

MSDSs (Note: A number of organizations maintain databases that contain MSDS information. The following is a short list of web sites with MSDS information.)
www.dehs.umn.edu/msds.html
www.nwfsc.noaa.gov/msds.html
www.chem.utah.edu/msds

SPECIATE
www.epa.gov/ttn/chief/software.html#speciate

TANKS
www.epa.gov/ttn/chief/tanks.html

TOXNET
www.nlm.nih.gov/pubs/factsheets/toxnetfs.html

TRI homepage
www.epa.gov/opptintr/tri